

UM - 53

Texas Water Development Board



Safety in Field Activities

**A
Field Safety Manual
for the Collection of Aquifer Data
by**

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1.1 Safety policies and requirements

This manual is required reading for Texas Water Development Board (TWDB) personnel who will be involved in the collection of water quality data. Using the information in this manual, **field personnel are responsible for establishing and implementing safety procedures appropriate for their field activities.**

To ensure safety, fieldwork requires an awareness of potential hazards and knowledge of recommended procedures. The collection of water quality data in the field brings field personnel in touch with numerous hazards. Personnel routinely work in extreme environmental conditions and in remote locations. Many assignments require the transportation and use of equipment, chemicals, and compressed inert gas cylinders. Sample collection sites can involve working near heavy machinery. Personnel routinely come in contact with waterborne and airborne chemicals, pathogens, potentially dangerous animals, plants, and insects.

This manual, A Field Safety Manual for the Collection of Aquifer Data, describes standard safety operation procedures and guidelines to be used by TWDB field personnel. Included in the manual are policies related to field safety; procedures for the safe transport of people and equipment; handling of chemicals; and information on potentially hazardous environmental conditions, animals, and plants.

TWDB employees are required to become familiar with the information provided in this manual.

1.1.1 Safety policies

State and local government workers are excluded from Federal coverage under the Occupational Safety and Health Act of 1970 (the “OSH Act”). However, pursuant to **Texas Labor Code, Title 5, Chapter 412, Subchapter F, Section 412.051 (Duties of State Agencies)**, each state agency shall actively manage the risks of that agency TWDB is committed to the prevention of injury and illness of its employees. A comprehensive safety and health program, which follows OSHA guidelines, is essential in maintaining a safe and healthy work environment and vital in reducing work-related injuries and illness.

TWDB Groundwater Resources Division employees will be responsible for following the practices and procedures outlined in this policy.

Department of Transportation (DOT) policies are found in the *U.S. Code of Federal Regulations* (CFR) title 49 (U.S. Department of Transportation, 1995). DOT regulates transportation of hazardous materials by authority of the Hazardous Materials Transportation Act (HMTA) of 1974. For example, 49 CFR, parts 171-177, give transportation guidelines which include material description and classification, packaging and package labeling, and quantity limitations (See 1.4.2 Transporting chemicals).

1.1.2 Training

Field personnel must be aware of safety training requirements needed to perform specific tasks. For example,

Field personnel who operate state-owned or leased vehicles must attend at least one driving safety class every three years.

Safety training, certification requirements, and recommendations are subject to change. TWDB field personnel will be notified as to any required safety training changes.

1.1.3 Entering private property

Personal safety maybe at risk if a landowner or tenant is not expecting a site visit. Although Chapter 16 of the Texas Water Code authorizes TWDB personnel to conduct site investigations and surveys on private property, the Code does not give agency employees permission to trespass on private property. The following procedures should be observed:

Make an appointment and obtain permission from the landowner/caretaker, tenant, or manager of the property or business you plan to visit. During your telephone conversation, state the nature of your business (water quality sampling, monitoring water levels, etc.), estimated time of arrival, duration of your visit, and other vital information.

If possible, park the assigned state vehicle in a prominent location.

All field personnel must carry their official identification card.

Always leave sites the same way you found them.

Observe posted speed limits on private ranch and farm roads.

Be courteous to those you encounter during your travels. You are a representative of the TWDB and should always act in a professional manner.

1.2 Transportation

1.2.1 Road vehicles

Passenger cars, vans, and 4-wheel-drive vehicles can differ in operation and in safety features, depending on the vehicle's age, make, and model. Become familiar with all operating systems of the vehicle before you leave for the field---test operation of lights, locks, seat belts, windows, 4-wheel drive, tire pressure, and hood release.

Requirements that apply to all TWDB employees driving state vehicles:

Have a valid Texas driver's license.

Make sure state vehicle carries a copy of TWDB's self-insurance letter.

Take a course in driver safety---the current requirement is to take the course every 3 years.

Inspect all vehicles before use.

Tie down or otherwise secure all cargo.

Wear a seat belt.

Obey all traffic regulations and operate your vehicle safely.

Report any mechanical problems and/or accidents, regardless of severity, to your supervisor immediately after the incident or as soon as a problem is noted.

Maintain your insurability. All TWDB employees operating a motor vehicle, as part of their job, must be insurable under the agency's insurance policy. The agency's Human Resources Division performs driving record checks.

Obtain the training (if possible) that will help you handle potentially dangerous driving conditions such as wet, icy, or snow-filled roads; high wind velocity; glare from bright sunshine; and poor visibility from dust storms, fog, or heavy precipitation. In very hot climates, keep the windows slightly open when the vehicle is parked to avoid shattering windows from the heat. **To avoid asphyxiation from carbon monoxide, never sit or work in a closed vehicle with the engine running for more than a few minutes.**

1.2.2 Catalytic converter fire hazards

Understanding Fire Hazards with Catalyst-Equipped Cars

U.S. EPA Publication "Review of Catalyst Overheating Issue" March, 1983

History

Many 1975 and later model year automobiles are equipped with catalytic converters which serve as a primary means for reducing the emissions of air pollutants from these cars. The U.S. Environmental Protection Agency (EPA) has received reports concerning over-temperature problems or fire hazards from catalytic converters. This fact sheet has been prepared to respond efficiently to such inquiries.

How Catalytic Converters Get Hot

Catalysts reduce emissions by accelerating the combustion of pollutants leaving the engine. In doing this job, they get hot. The outside metal temperatures of some types of converters may approach 800 to 1000 F under conditions of extremely high engine loading. However, measurements by the United States Forest Service have shown surface temperatures equally as high in the exhaust systems of pre-1975 cars at extreme engine load conditions. Therefore, with this discovery, catalytic converter surface temperatures do not represent a new type of problem for automobile manufacturers and users as long as the engine is running properly.

However, if there is a partial ignition system failure, such as one or more misfiring spark plug or defective ignition wires, the temperatures of the catalytic converter surfaces and the exhaust system downstream from the converter may reach 1200 to 1400 F. This is because of the abnormal amount of unburned fuel delivered by the nonfiring cylinders. Further, once hot, the converter will take longer to cool off than other parts of the exhaust system because of its greater mass. This points out the need for careful attention to vehicle maintenance and alertness by vehicle owners to any signs of abnormal engine operation.

Precautions To Take

The EPA regulations require that any emission control system used by vehicle manufacturers "shall not in its operation, function, or malfunction result in unsafe conditions endangering the motor vehicle, its occupants, or persons or property in close proximity to the vehicle."

The vehicle manufacturers are aware of the need to provide protection from possible hazards or discomfort associated with high catalyst temperatures for both the vehicle occupants and vehicle components. In addition, protection is also necessary to avert possible fire hazards associated with driving vehicles through tall grass or other vegetation. The exact means taken by the different manufacturers to provide high temperature protection vary, and include such approaches as insulating the entire catalytic reactor so that the outside surfaces are not hotter than mufflers, installing protective metal shields between the converter shell and vegetation, and using thicker carpeting materials inside the car to protect the occupants from experiencing high floorboard temperatures. In addition, some cars have temperature-sensing devices to deactivate the catalytic reactor or alert the driver to abnormally high temperatures, which might be caused by misfiring spark plugs, etc.

Fires May Still Happen

The EPA has received reports of vehicle and vegetation fires in which catalysts were involved from both vehicle owners and from the National Highway Traffic Safety Administration (NHTSA), an organization which has been monitoring the frequency of such incidents with individual manufacturers. In some cases, it appears that combustible undercoating material had been applied to the catalyst and other exhaust system hardware. In most cases, vehicles were also reported to have been running badly with evidence of nonfiring spark plugs or other ignition system defects. If an abnormal amount of unburned fuel is fed to any catalyst, which occurs when the engine is misfiring in one or more cylinders, the catalyst will attempt to "do its job" by burning this fuel instead of simply expelling it out the exhaust pipe as the case with older cars. When this happens, the surface temperature of the catalyst container and the exhaust pipe can become abnormally hot, possibly leading to charring or burning of undercoating inadvertently sprayed on the catalyst or exhaust system, charring of floor mats in the car, or ignition of dry vegetation if the vehicle is operated off-road. Vehicle service manuals caution against applying undercoating on the catalyst of exhaust systems.

It should be noted that vegetation fires caused by hot automobile exhaust systems occurred before the advent of catalyst-equipped cars, and will occur in the future. The Forest Service has periodically conducted tests of cars for fire hazards since 1967 because of the long-standing concern by that agency over vehicle-induced fires in national forest recreational areas.

What Can Be Done in the Future

The EPA and NHTSA have been monitoring closely the frequency and type of such incidents. The NHTSA, on the basis of a review completed in December 1976, concluded that "the rate and nature of catalytic converter incidents do not present an unreasonable risk of health or injury to the public." The EPA will continue to require manufacturers to design their vehicles so that when properly operated and maintained they will pose no hazard to either life or property.

What You Can Do

If you keep your car properly maintained as recommended in your owners manual, you should normally have no problems. If you notice the engine running rough, you may have a misfiring spark plug. Be sure to have that checked promptly, not only to avoid catalyst overheating but also to restore good performance and save fuel.

Never park a catalyst-equipped car, or any car, on a pile of dry leaves or other dry vegetation. Normal caution in how you use your car is all that is needed to avoid catalyst fires.

1.3 Groundwater activities

Each well site is unique. Site hazards may not be known before or be evident during the site visit. Check the field folder for site information relating to safety to prepare for the field trip.

1.3.1 Wellsites

Wells can be located in open, unprotected areas as well as in enclosures such as shelters, well houses, or vaults. These sites and enclosures can contain dangerous chemicals and fumes, animals and plants, and large machinery with high-capacity power systems.

Before departing for the field site, obtain permission, oral or written, from the well owner or an authorized representative to enter the site. Entering a privately owned site without permission is considered trespassing. Inventory the safety and sampling equipment you will need for your trip, adding items specific to your program or study (**See Appendix, p. 30**).

When arriving at the site, use your senses. Do you see warning signs posted or animals grazing? Hear gunshots? See exposed electrical connectors and wires? Smell fumes? Decide how to handle such circumstances to ensure your safety.

Well houses, shelters constructed over wells, and well casing often are havens for bees, wasps, spiders, snakes, and rodents. Check your surroundings carefully for signs of animals before starting work. If you smell, hear, or see signs of animal infestation, proceed only after taking necessary precautions.

Check the well house or shelter carefully for chemical fumes and for faulty power systems.

Visually inspect the area before putting your hands, head, or feet into a confined space such as a well or pump cellar.

Poorly ventilated shelters are especially hazardous and can be classified as "confined spaces," which are defined in and regulated by OSHA 29 CFR 1910.146 policies.

Never turn on an owner's pump without permission. The system may be turned off for a safety reason. Not only could you cause yourself great harm, you could injure someone who might be near or working on the system.

1.3.2 Machinery, pumps, and other equipment

Groundwater samples usually are collected from a well with a permanently installed pump; sampling may require occasionally working around heavy machinery and large industrial systems. Heavy machinery, equipment, and power supplies are potentially dangerous.

Since equipment and power systems vary greatly, knowledge of their operation or having a company representative present during sampling operations is paramount to a safe and successful sampling trip.

Watch for unguarded moving parts, exposed and ungrounded wiring, hazardous fuels, and faulty or inadequate repairs. Use caution when lowering a well tape down a well to measure water level. Lines can get caught around rotating parts of pumps and be wrenched from your hands. Wells with electrically powered submersible pumps can be energized by a short in the electrical circuit, and in turn can conduct the power surge to you through the steel tape.

1.4 Chemicals

1.4.1 Use and handling

For safe use of chemicals, follow the guidelines given below, communicate hazards to all members of the Groundwater Resources Division, use proper personal protective equipment, and apply common sense when working with dangerous substances.

Obtain information about the chemical or compound

Material Safety Data Sheets (MSDS) supply material characteristics such as chemical description, fire and explosion data, chemical compatibility and reactivity, protection precautions, and spill procedures. These documents are required by OSHA 29 CFR 1910.1200 (hazard communication) and usually are shipped with chemicals when purchased. Your safety officer or chemical supplier also can provide the MSDS needed (**See Appendix, p. 31**).

Chemical safety information is available from many Federal and private sources. For example, the Permissible Exposure Limit (PEL) of a given chemical is listed by OSHA 29 CFR 1910.1000, subpart Z, and in the *Pocket Guide to Chemical Hazards* published by the National Institute for Occupational Safety and Health (June 1994).

1.4.2 Personal protective equipment (PPE)

Personal Protective Equipment (PPE) is defined as safety equipment for your skin, eyes, ears, face, head, extremities, and respiration. Proper PPE selection is based on the hazards likely to be encountered in the field.

Wear gloves that will provide adequate protection. Gloves become ineffective if the chemical you are using dissolves them. Vinyl gloves are used for handling inorganic acids and bases. Latex gloves are used for handling relatively mild organic solvents, such as methanol and acetone; nitrile gloves can be used for some stronger organic solvents.

Avoid unnecessary exposures and spills. Never place chemical containers where they can be knocked over. For example: Clean up chemical residues or spills immediately and appropriately. Keep chemical spill kits near the work area. For example: Carry a couple of boxes of baking soda to neutralize acid spills.

Keep eye wash kits readily accessible while working with chemicals.

When preparing a hydrochloric or nitric acid cleaning solution, put water in the vessel **first** and then add the acid.

Open chemical containers slowly and carefully, wearing proper PPE. Allow hot containers to cool before opening. Open frozen or encrusted lids with caution.

1.4.3 Transporting chemicals

The TWDB transports small quantities of chemicals for use in field activities. The TWDB is not considered a commercial carrier that, by definition, transports materials in commerce or in the furtherance of a commercial enterprise (transporting for profit).

It is not necessary to placard your vehicle when transporting small quantities of chemicals. Placarding a vehicle informs enforcement and emergency response personnel that the vehicle contains large amounts of the placarded material. For their own safety, first-response teams might not immediately approach a wrecked vehicle that is placarded for a highly dangerous or reactive material.

For safe containment and transport of chemicals

Protect yourself and passengers in the vehicle by stowing and securing chemicals away from the passenger compartment and behind a safety screen or barrier.

Stow compressed gas cylinders securely and in a vertical position, if possible. Never transport cylinders with regulators attached, or with safety caps missing.

Carry spill kit(s) appropriate for the chemicals being transported. Label packages as to their contents and remove old, inappropriate labels from containers that are being reused.

Keep a chemical inventory list in the glove box or side door pocket of the vehicle. This list should also have an emergency contact name and phone number. Keep a copy of each chemical's Material Safety Data Sheet (MSDS) here as well.

Waste products should be transported in the same safe and approved manner as other hazardous materials.

1.4.4 Storage and disposal

Chemicals require strict storage procedures for safety reasons, as well as to avoid chemical degradation, volatilization, and contamination. Specific storage areas should be designated in your vehicle. Use appropriate, approved chemical storage cabinets. Never store incompatible materials together.

Separate storage is needed for acids, corrosives, and flammables.

Do not indiscriminately dump chemicals or pathogens down sinks, toilets, or drains.

Do not let chemical wastes accumulate in your vehicle or office. Waste disposal storage areas should be established and used.

Do not mix incompatible wastes and always label waste containers to indicate their contents.

1.5 Environmental conditions

Fieldwork often is necessary under adverse atmospheric and other environmental conditions. Unpredictable occurrences, such as changing weather conditions, require event-response planning. Prepare for extreme conditions that might be experienced in your area of the study. Before leaving for the field, check the weather forecast using one or more of these options: the local television station, the national weather channel, or computer networks.

1.5.1 Temperature and sun exposure

Extremes of air temperature can occur in all parts of Texas. The ideal comfort range for humans is 16 to 32°C (60 to 90°F). Hypothermia and hyperthermia normally occur in temperatures outside this range.

Hypothermia is a condition of reduced body temperature caused by exposure to cold, and aggravated by wet clothes, wind, hunger, and exhaustion. Hypothermia in extremities can lead to frostbite. Hypothermia can occur with air temperature above 16°C (60°F) under wet and (or) windy conditions. The best way to avoid hypothermia is to dress warm and stay dry.

The warning signals of hypothermia are uncontrollable fits of shivering, incoherence, listlessness, fumbling hands, frequent stumbling, drowsiness, and inability to get up after resting. Victims of hypothermia must be treated immediately by removing them from exposure to the elements, replacing wet clothes with dry ones, and giving them warm, non-alcoholic drinks. Seek emergency facilities as soon as possible.

To prevent hypothermia: Dress in layers. Stay dry.

Hyperthermia is a condition of increased body temperature caused by exposure to excessive heat. Contributing factors are physical exertion, clothing, humidity, lack of air movement, and temperature, but the most important factor is body hydration. The normal body requirement for fluids in temperate regions is 2 1/2 quarts per day; desert conditions require more fluid. Early warning symptoms of hyperthermia are chilling, a throbbing pressure in the head, unsteadiness, dizziness, nausea, dry skin (either hot and red or cool and pale), rapid pulse, and muscle pains and spasms. Persons suffering from hyperthermia should seek medical attention immediately. First aid involves cooling down and rehydrating.

To avoid hyperthermia:

Drink water in moderate amounts on a scheduled basis---do not wait until you are thirsty.

Avoid alcohol, caffeine, and soda---these liquids are not water substitutes.

Wear lightweight clothing and a wide-brimmed hat.

If possible, schedule activities that require the most exertion in early morning or late afternoon and not when air temperature is at its highest.

Sun exposure can have painful and dangerous short-term and long-term effects. Regardless of the region in Texas that you are working, take the proper precautions to protect your skin and eyes from excessive sun exposure.

To prevent excessive sun exposure:

Wear sunscreen on all exposed skin to avoid burning and skin cancer.

Wear sunglasses with polarized lenses to protect eyes, reduce glare, and improve vision.

1.5.2 Thunderstorms, tornadoes, and hurricanes

Thunderstorms, which can be accompanied by hail, are common throughout the United States. Weather forecasters predict some. Others can move into an area with almost no advance warning. Watch the sky for signs of thunderstorms and seek shelter before the weather deteriorates. Lightning is extremely dangerous and should be respected.

Seek shelter inside a vehicle or building; keep away from open doors and windows, plugged-in appliances, and metal. Avoid contact with metal objects in a vehicle.

Do not use a telephone.

If outside, do not congregate. In case of a lightning strike, someone must be able to begin revival techniques immediately, such as cardiopulmonary resuscitation (CPR).

Put on rubber boots or rubber-soled shoes.

Do not work on or around electrical lines, pipes, or steel structures.

Do not use metal objects such as water-level measuring tapes.

If caught in the open, crouch down low, but do not lie flat on the ground. Avoid standing near isolated trees.

Seek lower elevations such as valleys or canyons---avoid being on peaks or ridges.

If you feel your hair standing on end and your skin tingling, this is a sign that lightning might be about to strike---crouch immediately (feet together, hands on knees).

Tornadoes sometimes accompany thunderstorms. Tornadoes are violently rotating columns of air that descend from the clouds in a funnel formation. A weather channel or weather-band radio will sometimes provide advance warning of possible tornadoes.

Seek shelter immediately if there is a sudden, violent change in weather involving wind, rain, hail, or funnel-shaped clouds.

Avoid occupying vehicles or mobile homes.

If you are caught outside, find a ravine, ditch, or culvert and lie flat.

If inside, go to the basement or lowest interior reinforced part of the structure, such as a closet or bathroom. Stay away from windows.

Hurricanes are severe tropical cyclones with winds exceeding 74 miles per hour, and also can contain heavy rain. Stay informed as to the projected path of an approaching hurricane. Field activities should not be conducted until the hurricane has moved out of the area.

1.5.3 Floods

Rain can fall at a rate of several inches per hour and rapidly create dangerous flash flood conditions, either in the area where you are working or several miles away. Weather forecasts will be helpful in planning your activities accordingly to ensure your safety. Always be aware of rapidly rising stages in rivers and creeks. Beware of dry creekbeds that can become raging rivers in a short period of time.

1.5.4 Fire

Fire can spread out of control rapidly--call 911 if you notice a brush fire or other type of threatening fire or smoke. Working inside your field vehicle or outside at your field site requires fire prevention measures. Do not smoke. Keep matches stored in a metal container. Keep fire extinguishers visible and accessible.

Know how to operate fire extinguishers.

Know the type of fire for which an extinguisher is designed (extinguishers are different for ordinary combustibles, flammable liquids, and electrical equipment).

Never point an extinguisher at a person's face.

Recharge fire extinguishers according to the schedule provided with the extinguisher.

1.5.5 Snow and ice

Snow and ice are dynamic mediums that change quickly in structure and strength. Snow and ice can accumulate rapidly, hiding hazards, and creating slippery conditions. Heavy snowfall (white-outs) can be disorienting. Wear layers of appropriate clothing, carry emergency equipment and follow the driving guidelines presented below:

Driving on ice and snow

KNOW YOUR VEHICLE

Not all cars respond the same to snowy or icy road conditions. For that reason, knowing how to handle your vehicle and how it responds in various weather conditions is important. AAA recommends that motorists practice slow-speed maneuvers on an empty snow or ice covered parking lot. You should also page through your owner's manual, familiarizing yourself with your vehicle's braking system and tire traction.

DISTANCE FACTOR

The most important thing to remember when driving on slick roads is that you must travel, steer, and brake more slowly than usual. The distance needed to stop on ice is twice as long as that you would need to brake under normal driving circumstances. This means you should keep at least a three-car distance from the vehicle directly in front of you.

BLACK ICE

Black ice is defined as ice that remains on roadways that are not subjected to direct sunlight. Black ice commonly forms on roads that wind around lakes and rivers, in tunnels, on overpasses and in highly shaded, rural areas. Black ice is almost invisible to the naked eye. Be especially leery when driving your car into shaded areas, and slow your vehicle down during your approach.

EXTRA SLIPPERY

Certain areas of roadways, because of location or lack of direct sunlight, are almost always more hazardous than others. Use extra caution when driving on bridges, overpasses, and tunnels.

FRONT WHEEL DRIVE

Front wheel drive vehicles handle better than rear wheel drive on slippery roads because the weight of the engine is on the drive wheels, which helps to improve your traction.

REAR WHEEL DRIVE

Because there is virtually no weight on the rear wheels of your car, vehicles that operate by using rear wheel drive tend to slide from side to side during turns on icy roads. Cars and light duty truck owners can place bags of sand or kitty litter in the bed of the truck or trunk to help balance the weight and distribute it equally.

KNOW YOUR BRAKES

Your owner's manual will provide information about your braking system. Not all braking systems are the same. Find out which type of brakes your vehicle uses and then follow the safety steps below.

ABS

Anti-lock braking systems (ABS) offer significant advantages on slick roads, if used correctly. To operate ABS effectively, motorists should apply steady pressure to the brake pedal during the entire stop. ABS will automatically pump the brakes, if necessary, to keep the wheels from locking. Never manually pump ABS brakes yourself. Apply only steady pressure continuously until you come to a complete stop.

NON-ABS

If you don't have ABS, you should gently apply pumping pressure to your brakes during slippery conditions. Do not apply steady pressure to your brakes. Standing on your brakes will only cause wheel lock and may result in your car spinning out of control.

LEARN TO HANDLE SKIDS

FRONT WHEEL DRIVE

The biggest problem facing most winter drivers is skidding on slick, icy or snow covered roads. It is possible to steer out of a skid! Once you feel your car begin to skid, slowly remove your foot from the accelerator, until you feel your wheels regain traction control. (Do not attempt to brake!) As your vehicle's tires grab the road, slowly turn the steering wheel in the direction you want your front wheels to go.

REAR WHEEL DRIVE

When you begin to spin, remove your foot from the gas pedal. Slowly steer in the direction you want the car to go. If you are still skidding out of control, counter-steer until your vehicle is pointing in the right direction. Never apply steady pressure to the brakes.

TIPS

You can improve your VISIBILITY by clearing all snow and ice from your vehicle. Be sure to remove ice and snow from hood, roof, trunk, turn signal lights, tail and headlights, windows, mirrors and fenders.

Use your LOW BEAMS when driving in an ice or snow storm. You'll have better visibility.

Allow for greater STOPPING DISTANCE during snow and ice storms. In order to bring your car to a safe stop, you must allow 8-10 seconds between you and the vehicle in front of you.

Remember that POSTED SPEED LIMITS are only to be followed during ideal weather conditions. Slow down while driving on snow or ice.

When driving UPHILL on ice, pick a path that will allow the most traction. Monitor vehicles in front of you and steer clear of areas where they spin wheels or slide backward. Unpacked snow will give most vehicles sufficient uphill traction.

To maintain control on CURVES and TURNS, reduce speed just before the turn. Any sudden acceleration or deceleration during a turn will send you into a skid.

NEVER brake while driving on ice. If you are approaching a patch of ice, brake during your approach. Applying pressure to your brakes while on ice will only throw you into a skid.

Maintain your TIRES. Tires that are in proper working condition and are adequately inflated provide better traction.

Travel GENTLY. Everything you do on icy roads will affect how your vehicle handles the situation. Move slowly. Turn slowly. Brake slowly. Sudden changes can cause your car to spin out of control.

EMERGENCY WEATHER KIT

Having a well stocked emergency kit in your car can help to save your life and make you more comfortable during breakdowns, accidents and long waits. Your kit should include:

Battery jumper cables

First aid kit

Shovel

Basic tools (pliers, wrench, screwdriver, and knife)

Blankets

Extra clothing (hats, socks, boots, mittens)

Flashlight

Snow and/or ice scraper

Bag of sand

Cellular phone

1.6 Animals

Most groundwater monitoring activities take place in and around areas inhabited by animals. Before a field trip, try to find out which species inhabit the area and how to deal with them. **Table 1-1 (p.22)** summarizes guidelines on what to do if faced with dangerous animals. Note that such guidelines can vary from expert to expert; the right way to deal with encounters could well be what works at the time.

Most animals will vigorously protect their young and should not be approached or disturbed.

If a threat or an injury occurs, the most important action is to remain calm and focus on taking the appropriate steps to relieve, remedy, or rescue you or another victim. Call for medical advice before transporting the victim, if possible.

1.6.1 Arachnids and insects

The most common remedy for bites and stings usually involves basic first aid, followed by immediate medical attention if symptoms warrant. Treatment procedures should be reviewed before field activity begins. Persons with known allergic reactions to insects should wear or carry on their person medical alert identification and carry sting kits for use in emergencies.

Scorpions, spiders, and ticks

Arachnids such as scorpions, spiders, and ticks are cause for caution by the field team. Spiders and scorpions are known to inhabit enclosed, dark spaces such as shoes or the corners of well houses and shelters.

Scorpions. Scorpions are known to frequent the desert, but also have been found frozen in ice. Scorpions are not easily seen in the wild. They are nocturnal creatures that are sensitive to vibrations, either in the air or on the ground. When humans are stomping around, scorpions usually run for cover. Scorpion stings often involve an encounter between a big toe and a scorpion that has crawled into a shoe. Check shoes and boots left in the field vehicle before putting them on. **Beware of putting your hands and feet into small, dark spaces (Table 1-1).**

Spiders. Although few spiders in North America bite people, and the venom of most is harmless (Audubon Society, 1980), exceptions include the black widow and the brown recluse (**Figure1-6-1**). The black widow (*Latrodectus mactans*) has a fairly large geographical range. Red and brown widow spiders are found mainly in the Gulf Coast region of the United States. The brown recluse (*Loxosceles reclusa*) frequents areas of human habitation and prefers dark spaces such as equipment shelters, as well as areas in the wild. It is advisable to be familiar with the area in which you are working and take care when walking and when reaching into small spaces.

Ticks. Ticks are found nearly everywhere in North America and can transmit diseases such as Rocky Mountain spotted fever and Lyme disease.

To reduce your chances of being exposed to ticks, wear long pants and tuck the pants legs into your socks; use a repellent containing the compound DEET (N-diethyl-meta-toluamide) on exposed skin, except for the face; and check your body regularly for ticks, including inspection of the neck and scalp. Remove attached ticks immediately (**Table 1-1**).

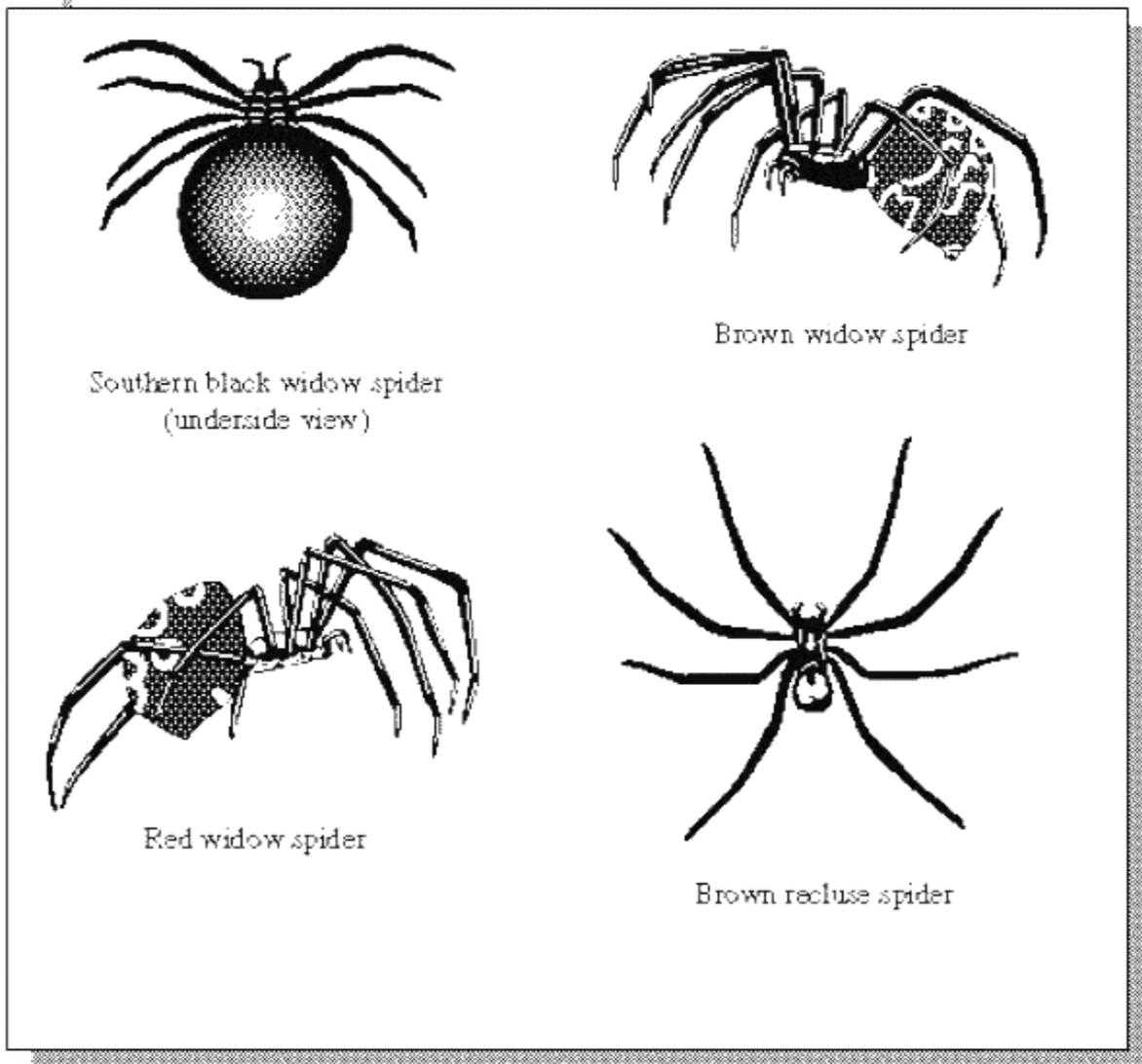


Figure 1-6-1. Sketches of selected spiders found in North America (from M.H. Cox, 1994.)

Bees and wasps

Venomous insects of common concern include bees and wasps. Bee stingers are equipped with barbs that should be scraped off if a person is stung---using forceps or tweezers to pull the stinger out can force more venom into the wound (**Table 1-1**).

A wasp stinger has no barb; the venom is injected and the stinger usually slides out. The yellow jacket (a vespid wasp) nests in the ground and will aggressively defend the nest if disturbed, particularly in the late summer and early fall. Stings in the mouth or throat sometimes result when a bee or wasp has flown into a can of soda. Seek medical attention if symptoms warrant.

1.6.2 Snakes

Snakes deserve our respect, but they do not have to be feared. Only about 10 percent of the approximately 3,000 species of snakes in the world are poisonous. Differences between poisonous and nonpoisonous snakes of North America are illustrated in **Figure 1-6-2**.

In the event of snakebite, take the victim to the nearest medical facility as soon as possible. Call the medical facility first if time allows. Medical personnel should treat even a person who has been bitten by a nonpoisonous snake, because some people are allergic to the foreign protein in snake saliva. Refer to **Table 1-1** for procedures to follow if bitten. The best advice regarding snakebites is to prevent them in the first place.

Do not put your hands or feet where you cannot see.

Never handle a snake unnecessarily, dead or alive, poisonous or nonpoisonous.

If you come upon a poisonous snake, turn and run. A snake normally can strike up to one-half or two-thirds of its body length, but if provoked it can strike up to its full body length. A common symptom of a poisonous snakebite from pit vipers (copperheads, cottonmouths or water moccasins, and rattlesnakes) is a burning, fiery, stinging pain at the bite site. Other symptoms could include swelling; skin discoloration; nausea and vomiting; a minty, metallic, rubbery taste in the mouth; sweating and chills. If the pain does not get any worse and remains localized, venom probably was not passed. If the pain becomes severe, venom was probably injected.

Copperheads (*Agkistrodon contortix*) have a wide distribution throughout the central, mid-Atlantic, and southern United States. They can be found on wooded hillsides or in areas near water. Although the bite of a copperhead can be painful, it is unlikely to result in an adult human death.

Cottonmouths or water moccasins (*Agkistrodon piscivorus*) are found in the southeastern United States and are never far from water. Cottonmouths usually swim with their entire body on top of the water (Huegel and Cook, undated). Cottonmouths might be seen in the daytime, but they are more active at night. They are an extremely aggressive snake and should not be approached.

Rattlesnakes have been found in every state except Alaska, Delaware, Hawaii, and Maine. All other states have at least one species of rattlesnake, and many have three or four. Arizona, for example, has 17 species or subspecies of rattlesnakes (Kauffeld, 1970). A rattling sound usually alerts that a nearby rattlesnake has been disturbed and can be preparing to strike, but if the snake is sufficiently disturbed, it might not rattle at all.

Treat alligators with extreme caution. Some can become a nuisance when they lose their fear of humans and usually have to be destroyed by licensed trappers. **Never approach an alligator, either on land or in the water.** Alligators can outrun humans for short distances. If your sampling involves fish collection, get the specimens out and away from the water as soon as possible.

1.6.4 Bears

When drought conditions occur in New Mexico, bears migrate into portions of Western Texas searching for new water sources; and as a result, increase the chances for human contact. Bear behavior is unpredictable; bears fiercely defend any carcasses and will often bury or partially cover such prizes for later. Contrary to popular belief, bears can see almost as well as people, but trust their noses much more than their eyes or ears.

Avoiding contact with a bear is the best defense:

Avoid game trails that bears might use.

Avoid carrion (dead and decaying flesh), fresh kills, or gut piles.

Avoid berry patches, or other areas abundant with plants that bears use for food.

Avoid willow and dry grass patches; bears sometimes use these areas for daybeds.

Avoid areas with fresh bear tracks.

Make noise or wear bells when moving through the woods so as not to surprise bears.

Avoid carrying food that a bear can smell. Always keep food sealed and in a backpack, not in a pants pocket.

If you meet a bear on the trail, effective methods of defense can vary:

If you see the bear before it sees you, decide on your route of escape and leave the area at once.

If you find yourself close to a bear, give the bear all the room you can.

Let the bear know you are human---talk in a normal voice and wave your arms. Try to back away slowly, but if the bear follows, stop and hold your ground.

Do not run! Bears often make bluff charges, sometimes within 10 feet of their adversary, without making contact.

If a bear actually makes contact, surrender! Fall to the ground and play dead. Typically, a bear will break off its attack once it feels the threat has been eliminated. If the bear continues to bite after you assume a defensive posture, the attack is predatory and you should fight back vigorously.

1.6.5 Mountain lions

Mountain lions (*Felis concolor*) are a species of larger cats found in North America (also called cougar, puma, and panther). The primary habitat for these members of the cat family is west of the Rocky Mountains and south of the Yukon, although Florida has a small population. Mountain lions are active during the day and night, and search a wide territorial range for food. The main food source is deer and smaller animals.

Be alert to reports of mountain lion attacks or sightings. Healthy mountain lions do not usually attack humans, but when this occurs, it is usually because the person panicked and ran. Turning and running can evoke a predatory response from mountain lions.

1.6.6 Rodents and other small mammals

Rodents and other small mammals can be disease carriers. **The best policy is to avoid them;** know what animals are in your particular area and take appropriate precautions. Two diseases of concern carried by such animals are hantavirus and rabies.

Mice, rats, and chipmunks are the primary hosts of hantaviruses (Center for Disease Control, 1994a and b). Known carriers include the deer mouse (*Peromyscus maniculatus*), piñon mouse (*P. truei*), brush mouse (*P. boylii*), cotton rat (*Sigmodon hispidus*), and western chipmunk (*Tamias*). Hantavirus does not cause apparent illness in the host, but the infected individual sheds the virus in saliva, urine, and feces for many weeks. Rabies infection is another hazard of contact with small animals, especially skunks, raccoons, foxes, coyotes, bats, cats, and dogs.

The best way to eliminate the chance of infection from rodents and other small mammals is to secure the areas in which you will be working against an animal population. In well houses and recorder shelters, make sure all openings have been blocked before leaving the site. Subsequent inspections should be made on a routine basis to ensure that rodents have not found other means of access into the structure.

Structures with heavy rodent infestation must be treated with extreme caution and may require specific training to ensure proper precautions are used. Persons involved in cleanup should wear disposable coveralls, rubber boots or disposable shoe covers, rubber or plastic gloves, protective goggles, and appropriate respiratory protection, such as a half-mask air-purifying (or negative pressure) respirator with a high-efficiency particulate air (HEPA) filter or a powered air-purifying respirator (PAPR) with HEPA filters (Center for Disease Control, 1994b). Immediately after the clean-up operation, this personal protective equipment should be decontaminated or discarded using appropriate methods.

If the well house or recorder shelter is suspected of being inhabited by rodents, the following steps are to be followed before entering the structure:

Open the door or shelter lid and allow to air out for at least 30 minutes before entering.

Wear rubber or plastic gloves when working in the previously enclosed area.

Spray dead rodents, rodent nests, droppings, or other potentially tainted areas with a general-purpose household disinfectant. Soak the materials thoroughly with disinfectant and place in a plastic bag. Seal the bag and place it inside another plastic bag and then bury or burn. If this is not possible, contact the local or State health department for alternative disposal methods.

After removing the above items, disinfect the area with a solution of water, detergent, and disinfectant. Do not vacuum or sweep dry surfaces prior to disinfecting with a liquid solution.

1.6.7 Domestic animals

Sampling often involves working in urban or rural areas where cats, dogs, cows, horses, and other domesticated animals can be carriers of disease or exhibit unpredictable and aggressive behavior. Before entering private property, contact the owner and obtain permission to enter. Ask about any animals that might be on or around the property. Do not pet, feed, or otherwise contact these animals.

Table 1-1. Guidelines on potentially dangerous animals

(mm, millimeter; in., inch; cm, centimeter; ft, foot; lb, pound; mph, mile per hour)

Animals	Descriptions/ Characteristics	Procedure
Arachnids and Other Insects		
Black widow spiders (Black, brown and red)	Female (only one that bites) is black with abdomen almost spherical, usually with red hourglass mark below or with 2 transverse red marks separated by black. Spiderling is orange, brown, and white, gaining more black at each molt. Habitat amongst fallen branches and under objects, such as well shelters, furniture, and trash.	If bitten, seek medical attention as soon as possible.
Brown recluse spiders	Orange to yellow thorax with dark violin pattern. Bases of legs orange-yellow, rest of legs grayish to dark brown with no obvious pattern. Habitat outdoors in sheltered corners, among loose debris; indoors on the floor, and behind furniture in houses and outbuildings.	
Scorpions	Nocturnal, sensitive to vibrations. Field boots are favorite hiding place.	
Ticks	Small, less than 3 mm (<1/8 in). Clamps to host using a dart-like anchor located just below mouth.	Do Check for ticks during and after field work. Remove with tweezers within 24 hrs. Don't Leave the head imbedded. Extract using matches or applying petroleum jelly or other substance.
Bees	Vary in size from 2 mm (0.08 in) long; divided into a number of family classifications that are determined by mouth parts and other characteristics that are difficult to see without dissection.	Do Avoid all bee hives and wasp nests. Scrape off the bee stinger with a knife or other flat object.
Wasps	Wasps vary in size from minute up to 5 cm (2 in) long; adults distinguished by a narrow waist between the first and second abdominal segments.	Use an over-the-counter sting ointment or a solution of baking soda, meat tenderizer, and ammonia. Don't Use forceps or tweezers to pull bee stingers out.
Snakes and Alligators		
Copperhead snake	Elliptical eyes, short, stubby tail.	Do not confront a snake-turn and run.
Cottonmouth or water moccasin snakes	Elliptical eyes, short, stubby tail. Usually swims with entire body on top of the water. Never far from water. Most active at night. An extremely aggressive snake.	If bitten: Do Reassure the victim. Treat for shock. Keep victim lying down; elevate feet 10-12 in.

Table 1-1. Guidelines on potentially dangerous animals-Cont.

Animals	Descriptions/ Characteristics	Procedure
Snakes and Alligators-Continued		
Rattlesnakes	Elliptical eyes, short, stubby tail. The rattle is a sign of fear, but if the snake is sufficiently disturbed, it might not rattle at all.	Do-Continued Seek medical attention as soon as possible. Call medical facility while in route, if possible. Don't
Coral snakes	Wide red and black bands separated by a narrow, bright yellow band; the red and black bands never touch; round pupils; short, stubby tail.	Cut and suck affected area. Apply ice or a tourniquet. Leave victim unattended.
Alligators	Fairly inactive when water is cool. Most active during breeding season (mostly April and May). Alligators can run quickly for short distances.	Don't approach an alligator.
Mammals		
Black bears	Brown to black, white patch in front of chest, 5 ft in length, male 150-400 lb, female 125-250 lb, herbivores (primarily).	DO Make your presence known (sing, talk, tie bells to pack).
Brown bears	Dark brown to blonde, 7-9 ft in length, male 400-1,100 lb, female 200-600 lb, herbivores (primarily).	Travel in a group. Give bears plenty of room. Play dead if attacked. Lie flat on stomach or curl up in a ball with hands behind neck. Remain motionless as long as possible, until the bear is gone. If bear continues attack long after you play dead, it is probably a predatory attack. FIGHT BACK VIGOROUSLY! Don't Run. Bears run up to 35 mph. Imitate bear sounds or make a high-pitched squeal.
Rodents and small mammals: mice, chipmunks, rats, skunks, squirrels, raccoons, bats, foxes, coyotes	Animals infected with hantavirus show no signs of illness. Virus is transmitted from being bitten, or when infected saliva or excreta are inhaled as aerosols produced directly from the infected rodent, or when dried or fresh material contaminated by rodent excreta are disturbed, directly introduced into the broken skin, onto the mucous membrane covering the eyeball, or possibly ingesting contaminated food or water. Signs of an animal infected with rabies are nervousness, aggressiveness, excessive drooling and foaming at the mouth, abnormal behavior, such as wild animals losing their fear of humans or nocturnal animals being seen in the daytime.	Do Wash the wound thoroughly with soap and water. Seek medical attention. Notify game warden or health dept. Don't Capture the animal Pet or feed wild or domestic animals.
Domestic animals: Cats, dogs, cows		

1.7 Plants

The most common poisonous plants are the *Toxicodendrons*, or poison ivies, and include climbing and nonclimbing poison ivy, eastern poison oak, and poison sumac (**Figure 1-3**). Resins and secretions from these species are capable of inflicting a mild to serious skin rash on susceptible individuals (Frankel, 1991).

The best defense against *Toxicodendrons* and other poisonous plants is proper clothing. Long pants and sleeves will protect you in most cases, but plant poisons have been known to penetrate clothing. In the field, always wear shoes that protect your whole foot.

The oily resin of the plant is only slightly soluble in water, and the best treatment is to flush the area of skin contact with copious amounts of cold water (**Table 1-2**). A little water spreads the poison; lots of water washes it away. Soap can remove natural skin oils that protect against penetration of the resins; warm water can also hasten the absorption.

Table 1-2. Guidelines on poisonous plants

Plant	Description/Characteristics	Procedure
<p>Poison Ivy (<i>Toxicodendron rydbergii</i>)</p>	<p>Climbing poison ivy has alternate, trifoliate leaves, tiny greenish-white flower clusters or white berries, and aerial roots that grow straight and are fuzzy. Ubiquitous in most environments (seldom found in deep, dark forests or at elevations above 4,000 ft) (Frankel, 1991).</p> <p>Non-climbing poison ivy lacks aerial roots. The leaves are larger and broader than the climbing variety, but the pattern is still alternate trifoliate.</p>	<p>In case of skin contact:</p> <p>Do Flood the affected area with copious amounts of cold water as soon as possible.</p> <p>Don't Use soap. Use warm water.</p>
<p>Eastern poison oak (<i>Toxicodendron toxicarium</i>)</p>	<p>Prefers the sandy soil of the Atlantic and Gulf coasts. Distinguished by trifoliate fuzzy leaves, fuzzy fruits, and leaflets with rounded tips.</p>	
<p>Poison sumac (<i>Toxicodendron vernix</i>)</p>	<p>A tree that prefers a moist habitat such as bogs or swamps. Ranges in height from 6-20 ft. The alternate leaves are compound with 7-13 lobeless toothless leaflets arranged in a feather-like fashion with a single leaflet on the end. Can have white berries. The fruits of poisonous varieties of sumac droop downward,</p>	

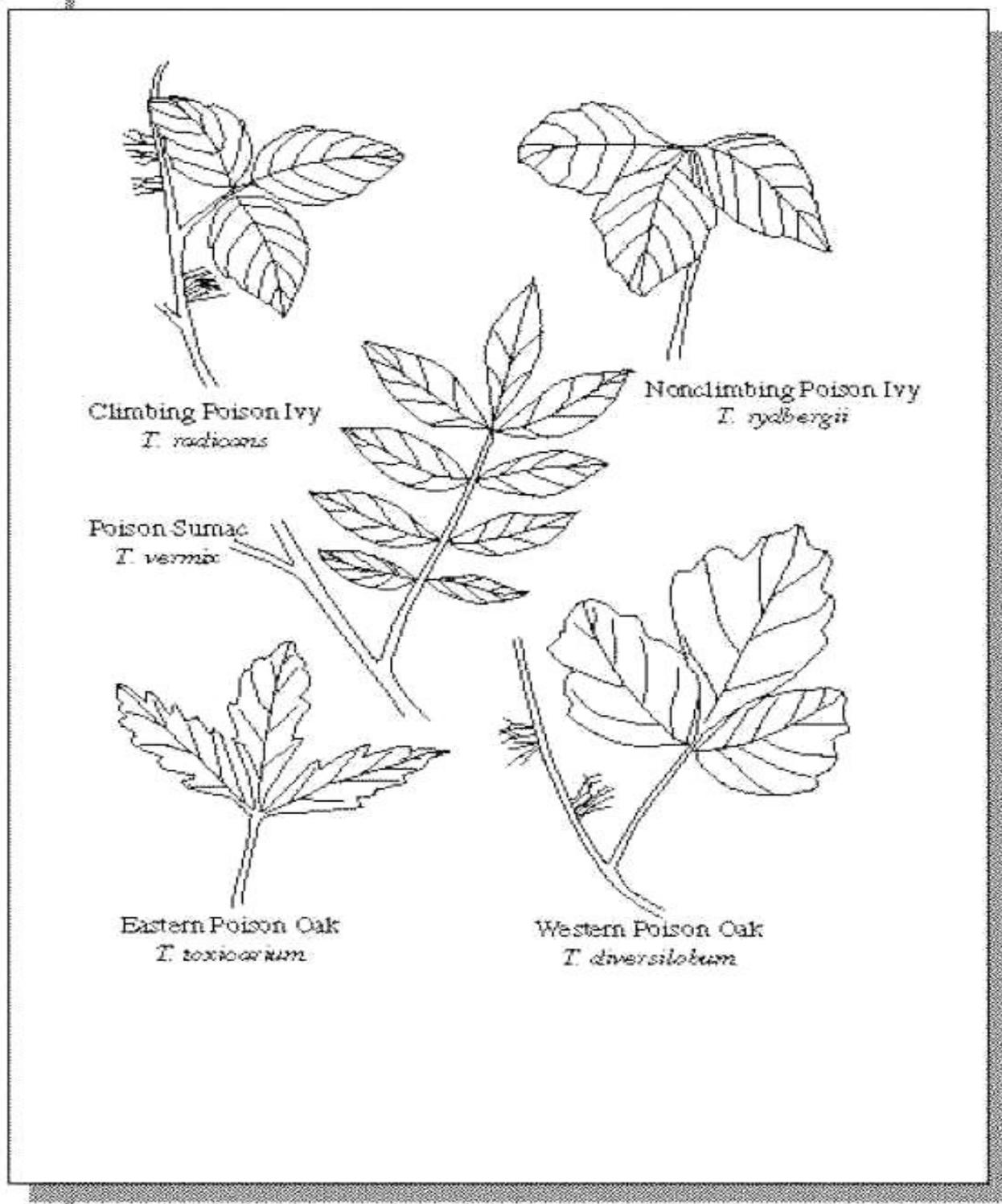


Figure 1-7-1. Five species of Toxicodendron found throughout the continental United States. (Frankel, 1991.)

SELECTED REFERENCES FOR SAFETY IN FIELD ACTIVITIES

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Lane, S.L., and Fay, R.G., 1998, National Field Manual for the Collection of Water-Quality Data, U.S. Geological Survey, TWRI Book 9, Chapter 9A.

National Institute for Occupational Safety and Health, June 1994, Pocket Guide to Chemical Hazards, Publication No. 94-116.

Texas Labor Code, Title 5, Chapter 412, Subchapter F, S 412.051.

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U.S. Department of Labor, 1995, Occupational Safety and Health Administration: U.S. Code of Federal Regulations, Title 29, Chapter 17, Parts 1900 to 1910.

U.S. Department of Transportation, 1990, Emergency response guidebook: U.S. Department of Transportation.

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U.S. Environmental Protection Agency, 1983, Review of Catalyst Overheating Issue.

Appendix

CPR-Self Administered

Water Quality Equipment Checklist

Water Quality MSDS

CPR-Self Administered

This article is from Health Cares, Rochester General Hospital, Chapter 240s newsletter, AND THE BEAT GOES ON (reprint from The Mended Hearts, Inc. publication, Heart Response).

Suddenly, you start experiencing severe pain in your chest that starts to radiate out into your arm and up into your jaw. You are only about five miles from the hospital nearest your home; unfortunately you don't know if you'll be able to make it that far. What can you do? You've been trained in CPR but the guy that taught the course neglected to tell you how to perform it on yourself.

Since many people are alone when they suffer a heart attack, this article seemed to be in order. Without help, the person whose heart stops beating properly and who begins to feel faint, has only about 10 seconds left before losing consciousness. However, these victims can help themselves by coughing repeatedly and very vigorously. A deep breath should be taken before each cough. The cough must be deep and prolonged, as when producing sputum from deep inside the chest. And a cough must be repeated about every 2 seconds without let up until help arrives, or until the heart is felt to be beating normally again.

Deep breaths get oxygen into the lungs and coughing movements squeeze the heart and keep the blood circulating. The squeezing pressure on the heart also helps it regain normal rhythm. In this way, heart attack victims can get to a hospital.

Water Quality Trip Equipment Checklist	HAVE	NEED
Water Quality Field Book - schedules, sketches, county map		
Water Level Field Book - schedules, sketches, county map		
Record Of Wells Printout		
Groundwater Quality Samples Printout		
TCEQ PWS Printout		
Drillers Logs		
Field Topos		
Sample Run Sheets		
Inventory Sheets		
Sketch Sheets		
Hach Sample Sheets		
LCRA COC Forms		
Cell Phone		
GPS		
Field Id, Master Card credit card, AT&T phone card		
Ice chests and temperature bottle		
Sample containers and labels		
Waterproof pen and clip board		
Calculator		
Writing utensils, rulers, 7 1/2 scale, template, lat/long scale		
Tools		
Plumbing fixtures		
Plastic manifold		
Hoses		
Tubing		
pH meter w/probes, KCl storage solution, extra batteries		
Conductivity meter w/probe, extra batteries		
pH buffers 4, 7, 10		
Conductivity standards		
Filter assembly, plastic ring gasket, filters		
Stir box and bar, extra batteries		
Beaker		
pH litmus paper		
Phenolphthalein indicator		
Bromcresol green and methyl red indicator		
Air temperature thermometer		
Burette stand, 25ml burette		
Graduated cylinder		
Acid pipettes		
Nitric acid preservative		
Sulfuric acid preservative		
0.02 N Sulfuric acid for titration		
DI water, spray bottle		
WL Steel tape - 300' and 500'		
WL E-line		
Pipe wrench		
First aid kit, snake bite kit, tow strap, air tank, safety glasses		
Rain suit, rags, gloves, hard hat, ear protection, shovel		
RECOMMENDED not required ITEMS BELOW		
Sunscreen, insect repellent, mud boots		
Cheater bar, machete		

M.S.D.S.

Material Safety Data Sheets For Groundwater Quality Sampling

**Bromocresol Green/Methyl Red Indicator Powder
Conductivity Standards: 500, 1000, 2000, & 5000
DPD Total Chlorine Reagent
pH 4.0 Buffer Reference Standard
pH 7.0 Buffer Reference Standard
pH 7.38 Buffer Reference Standard
pH 10.0 Buffer Reference Standard
Nitric Acid for Sample Preservation
Sulphuric Acid for Sample Preservation
Sulphuric Acid (0.0200 N) Titration Solution**

Hach Company
P.O.Box 389 MSDS No: M00009
Loveland, CO USA 80539
(970) 669-3050

Material Safety Data Sheet

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Bromcresol Green-Methyl Red Indicator Powder

Catalog Number: 94323

Hach Company Emergency Telephone Numbers:

P.O.Box 389 (Medical and Transportation)

Loveland, CO USA 80539 (303) 623-5716 24 Hour Service

(970) 669-3050 (515)232-2533 8am - 4pm CST

MSDS Number: M00009

Chemical Name: Not applicable

CAS No.: Not applicable

Chemical Formula: Not applicable

Chemical Family: Not applicable

Hazard: May cause irritation.

Date of MSDS Preparation:

Day: 3

Month: 05

Year: 2002

2. COMPOSITION / INFORMATION ON INGREDIENTS

Other components, each

CAS No.: Not applicable

TSCA CAS Number: Not applicable

Percent Range: < 1.0

Percent Range Units: weight / weight

LD50: Not applicable

LC50: Not applicable

TLV: Not established

PEL: Not established

Hazard: Any ingredient(s) of this product listed as "Other component(s)" is not considered a health hazard to the user of this product.

Potassium Chloride

CAS No.: 7447-40-7

TSCA CAS Number: 7447-40-7

Percent Range: >98

Percent Range Units: weight / weight

LD50: Oral rat LD₅₀ = 2600 mg/kg

LC50: None reported.

TLV: Not established.

PEL: Not established.

Hazard: May cause irritation.

3. HAZARDS IDENTIFICATION

Emergency Overview:

Appearance: Red-brown to green powder

Odor: None

MAY CAUSE EYE, SKIN AND RESPIRATORY TRACT IRRITATION

HMIS:

Health: 1

Flammability: 0

Reactivity: 0

Protective Equipment: X - See protective equipment, Section 8.

NFPA:

Health: 1

Flammability: 0

Reactivity: 0

Symbol: Not applicable

Potential Health Effects:

Eye Contact: May cause irritation
Skin Contact: May cause irritation
Skin Absorption: No effects anticipated
Target Organs: Not applicable
Ingestion: May cause: gastrointestinal disturbances blood pressure changes cardiac depression gastroenteritis
Target Organs: None reported
Inhalation: May cause: irritation of nose and throat
Target Organs: None reported
Medical Conditions Aggravated: Pre-existing: Kidney conditions
Chronic Effects: None reported
Cancer / Reproductive Toxicity Information:
This product does NOT contain any OSHA listed carcinogens.
This product does NOT contain any IARC listed chemicals.
This product does NOT contain any NTP listed chemicals.
Additional Cancer / Reproductive Toxicity Information: None reported
Toxicologically Synergistic Products: None reported

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.
Skin Contact (First Aid): Wash skin with plenty of water. Call physician if irritation develops.
Ingestion (First Aid): Give large quantities of water. Call physician immediately.
Inhalation: Remove to fresh air.

5. FIRE FIGHTING MEASURES

Flammable Properties: Does not burn, but may melt in a fire, releasing toxic fumes.
Flash Point: Not applicable
Method: Not applicable
Flammability Limits:
Lower Explosion Limits: Not applicable
Upper Explosion Limits: Not applicable
Autoignition Temperature: Not determined
Hazardous Combustion Products: None reported
Fire / Explosion Hazards: None reported
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Use media appropriate to surrounding fire conditions
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:
Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance.
Containment Technique: Stop spilled material from being released to the environment.
Clean-up Technique: Sweep up material. Dilute with a large excess of water. Flush the spilled material to the drain with a large excess of water.
Evacuation Procedure: Evacuate as needed to perform spill clean-up. If conditions warrant, increase the size of the evacuation.
Special Instructions (for accidental release): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
D.O.T. Emergency Response Guide Number: None

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin Do not breathe dust. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.
Storage: Keep container tightly closed when not in use.
Flammability Class: Not applicable

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Maintain general industrial hygiene practices when using this product.
Personal Protective Equipment:
Eye Protection: safety glasses with top and side shields
Skin Protection: disposable latex gloves lab coat

Inhalation Protection: adequate ventilation
Precautionary Measures: Avoid contact with: eyes skin Do not breathe: dust Wash thoroughly after handling.
TLV: Not established
PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: Red-brown to green powder
Physical State: Solid
Molecular Weight: Not applicable
Odor: None
pH: of 5% solution = 9.0
Vapor Pressure: Not applicable
Vapor Density (air = 1): Not applicable
Boiling Point: Not applicable
Melting Point: 181°C (358°F)
Specific Gravity (water = 1): 1.91
Evaporation Rate (water = 1): Not applicable
Volatile Organic Compounds Content: Not applicable
Partition Coefficient (n-octanol / water): Not determined
Solubility:
Water: Soluble
Acid: Soluble
Other: Not determined
Metal Corrosivity:
Steel: Not determined
Aluminum: Not determined

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.
Conditions to Avoid: Extreme temperatures Excess moisture
Reactivity / Incompatibility: None reported
Hazardous Decomposition: Toxic fumes of: chlorides
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:
LD50: None reported
LC50: None reported
Dermal Toxicity Data: None reported
Skin and Eye Irritation Data: None reported
Mutation Data: None reported
Reproductive Effects Data: None reported
Ingredient Toxicological Data: Potassium Chloride: Oral rat LD₅₀ = 2600 mg/kg, Oral man LD_{Lo} = 20 mg/kg

12. ECOLOGICAL INFORMATION

Product Ecological Information: --
No ecological data available for this product.
Ingredient Ecological Information: --
No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

EPA Waste ID Number: None
Special Instructions (Disposal): Dilute material with excess water making a weaker than 5% solution. Open cold water tap completely, slowly pour the material to the drain. Flush system with plenty of water.
Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

D.O.T.:
D.O.T. Proper Shipping Name: Not Currently Regulated
--
DOT Hazard Class: NA

DOT Subsidiary Risk: NA
DOT ID Number: NA
DOT Packing Group: NA
I.C.A.O.:
I.C.A.O. Proper Shipping Name: Not Currently Regulated

--
ICAO Hazard Class: NA
ICAO Subsidiary Risk: NA
ICAO ID Number: NA
ICAO Packing Group: NA
I.M.O.:
I.M.O. Proper Shipping Name: Not Currently Regulated

--
I.M.O. Hazard Class: NA
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: NA
I.M.O. Packing Group: NA

15. REGULATORY INFORMATION

U.S. Federal Regulations:

O.S.H.A.: This product meets the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)

E.P.A.:

S.A.R.A. Title III Section 311/312 Categorization (40 CFR 370): Immediate (Acute) Health Hazard

S.A.R.A. Title III Section 313 (40 CFR 372): This product does NOT contain any chemical subject to the reporting requirements of Section 313 of Title III of SARA.

--
302 (EHS) TPQ (40 CFR 355): Not applicable
304 CERCLA RQ (40 CFR 302.4): Not applicable
304 EHS RQ (40 CFR 355): Not applicable
Clean Water Act (40 CFR 116.4): Not applicable
RCRA: Contains no RCRA regulated substances.

C.P.S.C.: Not applicable

State Regulations:

California Prop. 65: No Prop. 65 listed chemicals are present in this product.

Identification of Prop. 65 Ingredient(s): None

Trade Secret Registry: Not applicable

National Inventories:

U.S. Inventory Status: All ingredients in this product are listed on the TSCA 8(b) Inventory (40 CFR 710).

TSCA CAS Number: Not applicable

16. OTHER INFORMATION

Intended Use: Indicator for pH

References: 29 CFR 1900 - 1910 (Code of Federal Regulations - Labor). Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983. TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. Technical Judgment. In-house information. Fire Protection Guide on Hazardous Materials, 10th Ed. Quincy, MA: National Fire Protection Fire Protection Guide on Hazardous Materials, 10th Ed. Quincy, MA: National Fire Protection Association, 1991.

Legend: NA - Not Applicable w/w - weight/weight

ND - Not Determined w/v - weight/volume

NV - Not Available v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE.

HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

HACH COMPANY ©2002

Section 1: Chemical Product and Company Identification

Catalog Numbers:

2234.075, 2235.09, 2236, 2236.02, 2236.03, 2236.04, 2236.05, 2236.06, 2236.07, 2236.08, 2236.09, 2236.10, 2236.11, 2236.12, 2236.14, 2236.15, 2236.19, 2236.21, 2236.24, 2236.25, 2236.26, 2236.35, 2236.47, 2236.49, 2236.51, 2236.52, 2236.53, 2236.54, 2236.58, 2236.60, 2236.65, 2236.65C, 2236.82, 2236.X, 2236.Y, 2237, 2238, 2238.22, 2239, 2239.34, 2240, 2240.42, 2240.45, 2240.47, 2241, 2242, 2242.3, 2243, 2243.12, 2244, 2244.20, 2244.25, 2244.39, 2244.50, 2245, 2245.60, 2245.70, 2245.90, 2246, 2246.10, 2246.12, 2246.13, 2246.14, 2246.17, 2246.70, R2236035, R2238940, R2242900, R2243180, R2245850

Product Identity:

CONDUCTIVITY STANDARDS, 5 - 17,000 Micromhos/cm at 25°C

Manufacturer's Name:

RICCA CHEMICAL COMPANY

Emergency Contact(24 hr)

CHEMTREC: 800-424-9300

CAGE Code: 0V553

Address:

PO BOX 13090
ARLINGTON, TX 76094

Telephone Number For Information:

817-461-5601

Date Prepared:

6/16/1998

Revision: 17

Last revised: 7/6/2004

Print Date: 7/16/2004

Section 2. Composition/Information on Ingredients

Component	CAS Registry#	Percent Concentration	ACGIH TLV	OSHA PEL
Water, Deionized	7732-18-5	Balance	Not Available	Not Available
Sodium Chloride	7647-14-5	< 1	Not Available	Not Available

Section 3 : Hazard Identification

Emergency Overview: Non-flammable, non-toxic, non-corrosive. Does not present any significant health hazards. May cause irritation. Wash areas of contact with water

Target Organs: eyes, skin

Eye Contact: May cause irritation, redness, pain, and tearing.

Inhalation: Not likely to be hazardous by inhalation.

Skin Contact: May cause irritation, redness, and pain.

Ingestion: Large quantity may cause burning of the throat, nausea, vomiting, and abdominal pain.

Chronic Effects/Carcinogenicity: None

IARC - No.

NTP - No.

OSHA - No.

Teratology (Birth Defect) Information: Mutation data cited in 'Registry of Toxic Effects of Chemical Substances' for Sodium Chloride.

Reproductive Information: Reproductive effects cited in 'Registry of Toxic Effects of Chemical Substances' for Sodium Chloride.

Section 4. First Aid Measures – In all cases, seek qualified evaluation.

Eye Contact: Irrigate immediately with large quantity of water for at least 15 minutes. Call a physician if irritation develops.

Inhalation: Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult, give oxygen.

Skin Contact: Flush with plenty of water for at least 15 minutes. Call a physician if irritation develops.

Ingestion: Dilute with water or milk. Do not induce vomiting. Call a physician if necessary.

Section 5. Fire Fighting Measures

Flash Point: Not Available.

Method Used: Not Available.

LFL: Not Available.

UFL: Not Available.

Extinguishing Media: Use any means suitable for extinguishing surrounding fire.

Fire & Explosion Hazards: Not considered to be a fire or explosion hazard.

Fire Fighting Instructions: Use normal procedures/instructions.

Fire Fighting Equipment: Use protective clothing and breathing equipment appropriate for the surrounding fire.

Section 6. Accidental Release Measures

Absorb with suitable material and dispose of in accordance with local regulations. Small amounts may be flushed to the sewer with excess water.

Section 7. Handling and Storage

As with all chemicals, wash hands thoroughly after handling. Avoid contact with eyes and skin. Protect from freezing and physical damage.

SAFETY STORAGE CODE: General

Section 8. Exposure Control/Personal Protection

Engineering Controls: No specific controls are needed. Normal room ventilation is adequate.

Respiratory Protection: Normal room ventilation is adequate.

Skin Protection: Chemical resistant gloves.

Eye Protection: Safety glasses or goggles.

Section 9. Physical and Chemical Properties

Appearance: Clear, Colorless Liquid

pH: Not Available.

Odor: Odorless

Boiling Point(°C): Approximately 100.1

Solubility in Water: Infinite

Melting Point(°C): Approximately (-6) -0

Specific Gravity: Approximately 1-1.01

Vapor Pressure: Not Applicable.

Section 10. Stability and Reactivity

Chemical Stability: Stable under normal conditions of use and storage.

Incompatibility: Strong oxidizing agents, Lithium, Bromine Trifluoride.

Hazardous Decomposition Products: Oxides of Sodium and fumes of Chlorine may be released when heated to decomposition.

Hazardous Polymerization: Will not occur.

Section 11. Toxicological Information

LD50, Oral, Rat: (Sodium Chloride) 3000 mg/kg, details of toxic effects not reported other than lethal dose value.

LD50, Dermal, Rabbit: (Sodium Chloride) >10 gm/kg.

Section 12. Ecological Information

Ecotoxicological Information: No information found

Chemical Fate Information: No information found

Section 13. Disposal Considerations

Dilute with water, then flush to sewer if local regulations allow. If not allowed, save for recovery or recycling in an approved waste disposal facility. Always dispose of in accordance with local, state and federal regulations.

Section 14. Transport Information

Not regulated by D.O.T.

Section 15. Regulatory Information (Not meant to be all inclusive - selected regulation represented)

OSHA Status: The above items either do not contain any specifically hazardous material or the potentially hazardous material is present in such low concentration that the items do not present any immediate threat to health and safety. These items do not meet the OSHA Hazard Communication Standard (29 CFR 1910.1200) definition of a hazardous material.

TSCA Status: All components of this solution are listed on the TSCA Inventory or are mixtures (hydrates) of items listed on the TSCA Inventory.

CERCLA Reportable Quantity: Not Reportable.

Sara Title III:

Section 302 Extremely Hazardous Substances: No.

Section 311/312 Hazardous Categories: No

Section 313 Toxic Chemicals: No.

RCRA Status: No.

California: None reported.

Florida: None reported.

Pennsylvania: None reported.

WHMIS Information (Canada):

Not applicable.

Section 16. Other Information

NFPA Ratings:	Health: 0	Flammability: 0	Reactivity: 0	Special Notice Key: None
HMIS Ratings:	Health: 0	Flammability: 0	Reactivity: 0	Protective Equipment: B (Protective Eyewear, Gloves)

Rev 1, 10-19-98: (Section 1) Specified catalog numbers; (Section 16) removed periods from NFPA and HMIS, added ® to HMIS.

Rev 2, 3-18-99: Added catalog numbers 2236.06, 2236.07, 2236.14, 2240.45, 2242, 2244.20, 2244.39, 2245.70 and 2246.17; (Section 11) specified LD50 information is for Sodium Chloride.

Rev 3, 6-14-99: (Section 1) added catalog numbers 2236.03 and 2236.11.

Rev 4, 9-20-2000: Reformatted from WordPerfect® to Microsoft Word®; (Section 1) revised emergency telephone number to CHEMTREC® 800-424-9300, added catalog numbers 2235.09, 2236.51, 2236.52, 2236.54, 2236.60, 2238.22, 2239.34, 2243.12, 2246.12 and 2246.14, Removed catalog numbers 2236.CA, 2236.CC and 2236.CO; (Section 3) Added Mutation data citing; (Section 4) removed note to physician; (Section 7) added storage code.

Rev 5, 10-09-2001: Reformatted to electronic data format.

Rev 6: 12-14-2001: (Section 1) added catalog numbers 2240.47 and 2245.60. Rev 7, 02-06-2002: (Section 1) added catalog number 2236.21. Rev 8, 02-26-2002: (Section 1) added catalog number 2236.24. Rev 9, 03-05-2002: (Section 1) added catalog number 2246.10. Rev 10, 03-21-2002: (Section 1) added catalog number 2242.3. Rev 11, 03-22-2002: (Section 3) removed yellow colored solution reference. Rev 12, 10-02-2003: (Section 1) added catalog number 2236.65C. Rev 13, 01-13-2004: (Section 1) added catalog number R2242900. Rev 14, 2-9-04: (Sec 1) added cat no R2245850. Rev 15, 2-24-04: (Sec 1) added catalog number R2236035. Rev 16, 4-6-04: (Sec 1) added catalog number R2238940. Rev 17, 7-6-04: added cat nos 2234.075 and R2243180.

When handled properly by qualified personnel, the product described herein does not present a significant health or safety hazard. Alteration of its characteristics by concentration, evaporation, addition of other substances, or other means may present hazards not specifically addressed herein and which must be evaluated by the user. The information furnished herein is believed to be accurate and represents the best data currently available to us. No warranty, expressed or implied, is made and RICCA CHEMICAL COMPANY assumes no legal responsibility or liability whatsoever resulting from its use.

World Headquarters
Hach Company
P.O.Box 389 MSDS No: M00110
Loveland, CO USA 80539
(970) 669-3050

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: DPD Total Chlorine Reagent
Catalog Number: 1406446
Hach Company Emergency Telephone Numbers:
P.O.Box 389 (Medical and Transportation)
Loveland, CO USA 80539 (303) 623-5716 24 Hour Service
(970) 669-3050 (515)232-2533 8am - 4pm CST
MSDS Number: M00110
Chemical Name: Not applicable
CAS No.: Not applicable
Chemical Formula: Not applicable
Chemical Family: Not applicable
Hazard: May cause sensitization. May cause irritation.
Date of MSDS Preparation:
Day: 12
Month: 07
Year: 2004

2. COMPOSITION / INFORMATION ON INGREDIENTS

Potassium Iodide
CAS No.: 7681-11-0
TSCA CAS Number: 7681-11-0
Percent Range: 20.0 - 30.0
Percent Range Units: weight / weight
LD50: Oral Mouse LD50 = 1862 mg/kg
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: Causes irritation.
Salt of N,N-Diethyl-p-Phenylenediamine
CAS No.: Confidential
TSCA CAS Number: Confidential
Percent Range: 1.0 - 5.0
Percent Range Units: weight / weight
LD50: Oral rat LD50 = 970 mg/kg.
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: May cause sensitization. May cause irritation.
Sodium Phosphate, Dibasic
CAS No.: 7558-79-4
TSCA CAS Number: 7558-79-4
Percent Range: 20.0 - 30.0
Percent Range Units: weight / weight
LD50: Oral rat LD50 = 17 g/kg.
LC50: None reported
TLV: Not established
PEL: Not established
Hazard: May cause irritation.
Other component
CAS No.: Not applicable
TSCA CAS Number: Not applicable
Percent Range: 0.1 - 1.0
Percent Range Units: weight / weight
LD50: Not applicable
LC50: Not applicable
TLV: Not established

PEL: Not established

Hazard: Any ingredient(s) of this product listed as "Other component(s)" is not considered a health hazard to the user of this product.

Carboxylate Salt

CAS No.: Confidential

TSCA CAS Number: Confidential

Percent Range: 40.0 50.0

Percent Range Units: weight / weight

LD50: None reported

LC50: None reported

TLV: Not established

PEL: Not established

Hazard: May cause irritation.

3. HAZARDS IDENTIFICATION

Emergency Overview:

Appearance: White or light pink powder

Odor: None

MAY CAUSE EYE AND RESPIRATORY TRACT IRRITATION

MAY CAUSE ALLERGIC SKIN REACTION

HMIS:

Health: 2

Flammability: 1

Reactivity: 0

Protective Equipment: X - See protective equipment, Section 8.

NFPA:

Health: 1

Flammability: 1

Reactivity: 0

Symbol: Not applicable

Potential Health Effects:

Eye Contact: May cause irritation

Skin Contact: May cause irritation May cause allergic reaction

Skin Absorption: No effects anticipated

Target Organs: Not applicable

Ingestion: Causes: lethargy loss of strength loss of coordination difficult breathing diarrhea May cause iodism, which symptoms include skin rash, conjunctivitis, runny nose, sneezing, bronchitis, headache, fever and irritation of mucous membranes. DPD Oral rat LD50 studies revealed decreased locomotor activity, depressed respiration, muscle spasms, loss of righting reflex and death. Autopsies revealed ulcerated stomach, enteritis, gas and congested lungs.

Target Organs: Liver

Inhalation: May cause: respiratory tract irritation Effects similar to those of ingestion.

Target Organs: Liver

Medical Conditions Aggravated: Allergy or sensitivity to salts of N,N-Diethyl-p-phenylenediamine Pre-existing: Eye conditions Skin conditions Respiratory conditions Persons with pre-existing respiratory conditions may be more susceptible to the effects of Potassium Iodide exposure.

Chronic Effects: Chronic overexposure may cause allergic skin reactions hypothyroidism liver damage DPD may cause allergic skin reactions in some people causing severe skin rashes and itching. Iodines overdose, 'iodism', may cause skin rash, runny nose, headaches, fever and bronchitis.

Cancer / Reproductive Toxicity Information:

This product does NOT contain any OSHA listed carcinogens.

This product does NOT contain any IARC listed chemicals.

This product does NOT contain any NTP listed chemicals.

Additional Cancer / Reproductive Toxicity Information: Maternal ingestion of potassium iodide during pregnancy may cause congenital goiter and hyperthyroidism in the newborn infant.

Toxicologically Synergistic Products: None reported

4. FIRST AID

Eye Contact: Immediately flush eyes with water for 15 minutes. Call physician.

Skin Contact (First Aid): Wash skin with soap and plenty of water. Call physician if irritation develops.

Ingestion (First Aid): Call physician immediately. Give 1-2 glasses of water under medical supervision. Never give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air.

5. FIRE FIGHTING MEASURES

Flammable Properties: During a fire, this product decomposes to form toxic gases.
Flash Point: Not applicable
Method: Not applicable
Flammability Limits:
Lower Explosion Limits: Not applicable
Upper Explosion Limits: Not applicable
Autoignition Temperature: Not determined
Hazardous Combustion Products: Toxic fumes of: carbon monoxide, carbon dioxide. iodine compounds phosphorus oxides potassium oxides sodium monoxide nitrogen oxides.
Fire / Explosion Hazards: None reported
Static Discharge: None reported.
Mechanical Impact: None reported
Extinguishing Media: Use media appropriate to surrounding fire conditions
Fire Fighting Instruction: As in any fire, wear self-contained breathing apparatus pressure-demand and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Spill Response Notice:

Only persons properly qualified to respond to an emergency involving hazardous substances may respond to a spill according to federal regulations (OSHA 29 CFR 1910.120(a)(v)) and per your company's emergency response plan and guidelines/procedures. See Section 13, Special Instructions for disposal assistance.

Containment Technique: Stop spilled material from being released to the environment.

Clean-up Technique: Scoop up spilled material into a large beaker and dissolve with water. Flush reacted material to the drain with a large excess of water. Decontaminate the area of the spill with a soap solution.

Evacuation Procedure: Evacuate as needed to perform spill clean-up. If conditions warrant, increase the size of the evacuation.

Special Instructions (for accidental release): Mixture contains a component which is regulated as a water pollutant.

304 EHS RQ (40 CFR 355): Not applicable

D.O.T. Emergency Response Guide Number: Not applicable

7. HANDLING / STORAGE

Handling: Avoid contact with eyes skin clothing Do not breathe dust. Wash thoroughly after handling. Maintain general industrial hygiene practices when using this product.

Storage: Store between 10° and 25°C. Protect from: light heat moisture

Flammability Class: Not applicable

8. EXPOSURE CONTROLS / PROTECTIVE EQUIPMENT

Engineering Controls: Have an eyewash station nearby. Use general ventilation to minimize exposure to mist, vapor or dust.

Personal Protective Equipment:

Eye Protection: safety glasses with top and side shields

Skin Protection: disposable latex gloves lab coat

Inhalation Protection: adequate ventilation

Precautionary Measures: Avoid contact with: eyes skin clothing Do not breathe: dust Wash thoroughly after handling.

Protect from: light heat moisture

TLV: Not established

PEL: Not established

9. PHYSICAL / CHEMICAL PROPERTIES

Appearance: White or light pink powder

Physical State: Solid

Molecular Weight: Not applicable

Odor: None

pH: of 1% soln = 6.35 @ 20°C

Vapor Pressure: Not applicable

Vapor Density (air = 1): Not applicable

Boiling Point: Not applicable

Melting Point: 145° C

Specific Gravity (water = 1): 1.79

Evaporation Rate (water = 1): Not applicable

Volatile Organic Compounds Content: Not applicable

Partition Coefficient (n-octanol / water): Not determined

Solubility:

Water: Soluble

Acid: Soluble
Other: Not determined
Metal Corrosivity:
Steel: 0.038 in/yr
Aluminum: 0.006 in/yr

10. STABILITY / REACTIVITY

Chemical Stability: Stable when stored under proper conditions.
Conditions to Avoid: Exposure to light. Excess moisture Extreme temperatures
Reactivity / Incompatibility: Incompatible with: oxidizers
Hazardous Decomposition: Heating to decomposition releases toxic and/or corrosive fumes of: carbon dioxide carbon monoxide iodine compounds phosphorus oxides potassium oxide nitrogen oxides
Hazardous Polymerization: Will not occur.

11. TOXICOLOGICAL INFORMATION

Product Toxicological Data:
LD50: Oral rat (female) LD₅₀ = 4700 mg/kg; Oral rat (male) LD₅₀ = 7000 mg/kg.
LC50: None reported
Dermal Toxicity Data: None reported
Skin and Eye Irritation Data: None reported
Mutation Data: None reported
Reproductive Effects Data: None reported
Ingredient Toxicological Data: DPD Oral rat LD50 = 970 mg/kg; Potassium Iodide Oral mouse LDLo = 1862 mg/kg;
Sodium Phosphate, Dibasic Oral rat LD50 = 17 g/kg

12. ECOLOGICAL INFORMATION

Product Ecological Information: --
No ecological data available for this product.
Ingredient Ecological Information: --
No ecological data available for the ingredients of this product.

13. DISPOSAL CONSIDERATIONS

EPA Waste ID Number: Not applicable
Special Instructions (Disposal): Dilute to 3 to 5 times the volume with cold water. Open cold water tap completely, slowly pour the material to the drain. Allow cold water to run for 5 minutes to completely flush the system.
Empty Containers: Rinse three times with an appropriate solvent. Dispose of empty container as normal trash.
NOTICE (Disposal): These disposal guidelines are based on federal regulations and may be superseded by more stringent state or local requirements. Please consult your local environmental regulators for more information.

14. TRANSPORT INFORMATION

D.O.T.:
D.O.T. Proper Shipping Name: Not Currently Regulated
--
DOT Hazard Class: NA
DOT Subsidiary Risk: NA
DOT ID Number: NA
DOT Packing Group: NA
I.C.A.O.:
I.C.A.O. Proper Shipping Name: Not Currently Regulated
--
ICAO Hazard Class: NA
ICAO Subsidiary Risk: NA
ICAO ID Number: NA
ICAO Packing Group: NA
I.M.O.:
I.M.O. Proper Shipping Name: Not Currently Regulated
--
I.M.O. Hazard Class: NA
I.M.O. Subsidiary Risk: NA
I.M.O. ID Number: NA
I.M.O. Packing Group: NA

15. REGULATORY INFORMATION

U.S. Federal Regulations:

O.S.H.A.: This product meets the criteria for a hazardous substance as defined in the Hazard Communication Standard. (29 CFR 1910.1200)

E.P.A.:

S.A.R.A. Title III Section 311/312 Categorization (40 CFR 370): Immediate (Acute) Health Hazard Delayed (Chronic) Health Hazard

S.A.R.A. Title III Section 313 (40 CFR 372): This product does NOT contain any chemical subject to the reporting requirements of Section 313 of Title III of SARA.

--

302 (EHS) TPQ (40 CFR 355): Not applicable

304 CERCLA RQ (40 CFR 302.4): Sodium phosphate, dibasic 5000 lbs.

304 EHS RQ (40 CFR 355): Not applicable

Clean Water Act (40 CFR 116.4): Sodium phosphate, dibasic - RQ 5000 lbs.

RCRA: Contains no RCRA regulated substances.

C.P.S.C.: Not applicable

State Regulations:

California Prop. 65: No Prop. 65 listed chemicals are present in this product.

Identification of Prop. 65 Ingredient(s): Not applicable

Trade Secret Registry: New Jersey Trade Secret Registry Number 80100131-5001 (Carboxylate Salt) New Jersey Trade Secret Registry Number 80100131-5002 (DPD Salt) New York Trade Secret Registry Number 478 (DPD Salt) New York Trade Secret Registry Number 479 (Carboxylate Salt) This product complies with Pennsylvania Trade Secret Regulations. This product is registered as a trade secret in the state of Illinois. This product is registered as a trade secret in the state of Massachusetts. This product is registered as a trade secret in the state of New York.

National Inventories:

U.S. Inventory Status: All ingredients in this product are listed on the TSCA 8(b) Inventory (40 CFR 710).

TSCA CAS Number: Not applicable

16. OTHER INFORMATION

Intended Use: Indicator for total chlorine

References: CCINFO MSDS/FTSS. Canadian Centre for Occupational Health and Safety. Hamilton, Ontario Canada: 30 June 1993. The Merck Index, 11th Ed. Rahway, New Jersey: Merck and Co., Inc., 1989. Outside Testing. Technical Judgment. In-house information. TLV's Threshold Limit Values and Biological Exposure Indices for 1992-1993. American Conference of Governmental Industrial Hygienists, 1992. Air Contaminants, Federal Register, Vol. 54, No. 12. Thursday, January 19, 1989. pp. 2332-2983.

Revision Summary:

Legend: NA - Not Applicable w/w - weight/weight

ND - Not Determined w/v - weight/volume

NV - Not Available v/v - volume/volume

USER RESPONSIBILITY: Each user should read and understand this information and incorporate it in individual site safety programs in accordance with applicable hazard communication standards and regulations.

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED TO BE ACCURATE.

HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

HACH COMPANY ©2004

Section 1: Chemical Product and Company Identification

Catalog Numbers:

1501, 1502, B017540

Product Identity:

BUFFER, REFERENCE STD, pH 4.00; BUFFER, PRECISION REFERENCE STD, pH 4.000 (Color Coded Red), including Solutions Plus brand

Manufacturer's Name:

RICCA CHEMICAL COMPANY

Emergency Contact(24 hr)**CHEMTREC:** 800-424-9300**CAGE Code:** 0V553**Address:**PO BOX 13090
ARLINGTON, TX 76094**Telephone Number For Information:**

817-461-5601

Date Prepared:

3/4/1999

Revision: 3

Last revised: 7/30/2003

Print Date: 7/16/2004

Section 2. Composition/Information on Ingredients

Component	CAS Registry#	Percent Concentration	ACGIH TLV	OSHA PEL
Preservative (No Mercury compounds or Formaldehyde)	Proprietary	<0.5	Not Available	Not Available
Inert Dye	proprietary	<0.1	Not Available	Not Available
Water, Deionized	7732-18-5	Balance	Not Available	Not Available
Potassium Acid Phthalate	877-24-7	0.95 - 1.05	Not Available	Not Available

Section 3 : Hazard Identification

Emergency Overview: Non-flammable, non-toxic, non-corrosive. Does not present any significant health hazards. Wash areas of contact with water.**Target Organs:** eyes, skin**Eye Contact:** May cause slight irritation.**Inhalation:** Not likely to be hazardous by inhalation.**Skin Contact:** May cause slight irritation.**Ingestion:** May cause nausea, vomiting, diarrhea and cramps.**Chronic Effects/Carcinogenicity:** None

IARC - No.

NTP - No.

OSHA - No.

Teratology (Birth Defect) Information: No information found.**Reproductive Information:** No information found.

Section 4. First Aid Measures – In all cases, seek qualified evaluation.

Eye Contact: Irrigate immediately with large quantity of water for at least 15 minutes. Call a physician if irritation develops.

Inhalation: Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult, give oxygen.

Skin Contact: Flush with plenty of water for at least 15 minutes. Call a physician if irritation develops.

Ingestion: Dilute with water or milk. Call a physician if necessary.

Section 5. Fire Fighting Measures

Flash Point: Not Available.

Method Used: Not Available.

LFL: Not Available.

UFL: Not Available.

Extinguishing Media: Use any means suitable for extinguishing surrounding fire.

Fire & Explosion Hazards: Not considered to be a fire or explosion hazard.

Fire Fighting Instructions: Use normal procedures/instructions.

Fire Fighting Equipment: Use protective clothing and breathing equipment appropriate for the surrounding fire.

Section 6. Accidental Release Measures

Absorb with suitable material and dispose of in accordance with local regulations.

Section 7. Handling and Storage

As with all chemicals, wash hands thoroughly after handling. Avoid contact with eyes and skin. Protect from freezing and physical damage.

SAFETY STORAGE CODE: General

Section 8. Exposure Control/Personal Protection

Engineering Controls: No specific controls are needed. Normal room ventilation is adequate.

Respiratory Protection: Normal room ventilation is adequate.

Skin Protection: Chemical resistant gloves.

Eye Protection: Safety glasses or goggles.

Section 9. Physical and Chemical Properties

Appearance: Clear, red colored liquid

pH: 4.0

Odor: Odorless

Boiling Point(°C): Approximately 100

Solubility in Water: Infinite

Melting Point(°C): Approximately 0

Specific Gravity: Approximately 1

Vapor Pressure: Not Applicable.

Section 10. Stability and Reactivity

Chemical Stability: Stable under normal conditions of use and storage.

Incompatibility: Nitric Acid

Hazardous Decomposition Products: Oxides of Carbon and Potassium.

Hazardous Polymerization: Will not occur.

Section 11. Toxicological Information

LD50, Oral, Rat: >3200 mg/kg (Potassium Acid Phthalate), details of toxic effects not reported other than lethal dose value.

Section 12. Ecological Information

Ecotoxicological Information: No information found.

Chemical Fate Information: No information found

Section 13. Disposal Considerations

Dilute with water, neutralize with weak sodium hydroxide solution, then flush to sewer if local regulations allow. If not allowed, save for recovery or recycling in an approved waste disposal facility. Always dispose of in accordance with local, state and federal regulations.

Section 14. Transport Information

Not regulated by D.O.T.

Section 15. Regulatory Information (Not meant to be all inclusive - selected regulation represented)

OSHA Status: The above items either do not contain any specifically hazardous material or the potentially hazardous material is present in such low concentration that the items do not present any immediate threat to health and safety. These items do not meet the OSHA Hazard Communication Standard (29 CFR 1910.1200) definition of a hazardous material.

TSCA Status: All components of this solution are listed on the TSCA Inventory or are mixtures (hydrates) of items listed on the TSCA Inventory.

CERCLA Reportable Quantity: Not Reportable.

Sara Title III:

Section 302 Extremely Hazardous Substances: No.

Section 311/312 Hazardous Categories: No

Section 313 Toxic Chemicals: No.

RCRA Status: No.

California: None reported.

Florida: None reported.

Pennsylvania: None reported.

WHMIS Information (Canada):

Not applicable.

Section 16. Other Information

NFPA Ratings:	Health: 1	Flammability: 0	Reactivity: 0	Special Notice Key: None
HMIS Ratings:	Health: 1	Flammability: 0	Reactivity: 0	Protective Equipment: B (Protective Eyewear, Gloves)

Rev 1, 3-7-2000: Reformatted from WordPerfect® to Microsoft Word®; (Section 1) Revised emergency telephone number to CHEMTREC® 800-424-9300; (Section 7) Added storage code, (Section 13) Added neutralize before flushing to sewer.

Rev 2, 10-09-2001: Reformatted to electronic data format.

Rev 3, 07-30-2003: (Section 1) added Solutions Plus catalog number effective 9-1-03.

When handled properly by qualified personnel, the product described herein does not present a significant health or safety hazard. Alteration of its characteristics by concentration, evaporation, addition of other substances, or other means may present hazards not specifically addressed herein and which must be evaluated by the user. The information furnished herein is believed to be accurate and represents the best data currently available to us. No warranty, expressed or implied, is made and RICCA CHEMICAL COMPANY assumes no legal responsibility or liability whatsoever resulting from its use.

Section 1: Chemical Product and Company Identification

Catalog Numbers:

1551, 1552, B017740, S1551

Product Identity:

BUFFER, REFERENCE STANDARD, pH 7.00; BUFFER, PRECISION REFERENCE STANDARD pH 7.000 (Color Coded Yellow), including Solutions Plus brands

Manufacturer's Name:

RICCA CHEMICAL COMPANY

Emergency Contact(24 hr)**CHEMTREC:** 800-424-9300**CAGE Code:** 0V553**Address:**PO BOX 13090
ARLINGTON, TX 76094**Telephone Number For Information:**

817-461-5601

Date Prepared:

6/16/1998

Revision: 6

Last revised: 4/1/2004

Print Date: 7/16/2004

Section 2. Composition/Information on Ingredients

Component	CAS Registry#	Percent Concentration	ACGIH TLV	OSHA PEL
Preservative (No Mercury compounds or Formaldehyde)	Proprietary	< 0.1	Not Available	Not Available
Inert Dye	proprietary	< 0.1	Not Available	Not Available
Water, Deionized	7732-18-5	Balance	Not Available	Not Available
Sodium Phosphate, Dibasic	7558-79-4	< 1	Not Available	Not Available
Potassium Phosphate, Monobasic	7778-77-0	< 1	Not Available	Not Available

Section 3 : Hazard Identification

Emergency Overview: Non-flammable, non-toxic, non-corrosive. Does not present any significant health hazards. May cause irritation. Wash areas of contact with water**Target Organs:** eyes, skin**Eye Contact:** May cause slight irritation.**Inhalation:** May cause allergic respiratory reaction to those allergic to phosphates.**Skin Contact:** May cause slight irritation to those allergic to phosphates.**Ingestion:** Large doses may cause stomach upset.**Chronic Effects/Carcinogenicity:** None

IARC - No.

NTP - No.

OSHA - No.

Teratology (Birth Defect) Information: No information found.**Reproductive Information:** No information found.

Section 4. First Aid Measures – In all cases, seek qualified evaluation.

Eye Contact: Irrigate immediately with large quantity of water for at least 15 minutes. Call a physician if irritation develops.

Inhalation: Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult, give oxygen.

Skin Contact: Flush with plenty of water for at least 15 minutes. Call a physician if irritation develops.

Ingestion: Dilute with water or milk. Call a physician if necessary.

Section 5. Fire Fighting Measures

Flash Point: Not Available.

Method Used: Not Available.

LFL: Not Available.

UFL: Not Available.

Extinguishing Media: Use any means suitable for extinguishing surrounding fire.

Fire & Explosion Hazards: Not considered to be a fire or explosion hazard.

Fire Fighting Instructions: Use normal procedures/instructions.

Fire Fighting Equipment: Use protective clothing and breathing equipment appropriate for the surrounding fire.

Section 6. Accidental Release Measures

Absorb with suitable material (vermiculite, clay, etc.) and dispose of in accordance with local regulations. Check with local agencies for the proper disposal of phosphate containing solutions.

Section 7. Handling and Storage

As with all chemicals, wash hands thoroughly after handling. Avoid contact with eyes and skin. Protect from freezing and physical damage.

SAFETY STORAGE CODE: General

Section 8. Exposure Control/Personal Protection

Engineering Controls: No specific controls are needed. Normal room ventilation is adequate.

Respiratory Protection: Normal room ventilation is adequate.

Skin Protection: Chemical resistant gloves.

Eye Protection: Safety glasses or goggles.

Section 9. Physical and Chemical Properties

Appearance: Clear, Yellow Liquid

pH: 7

Odor: Odorless

Boiling Point(°C): Approximately 100

Solubility in Water: Infinite

Melting Point(°C): Approximately 0

Specific Gravity: Approximately 1

Vapor Pressure: Not Applicable.

Section 10. Stability and Reactivity

Chemical Stability: Stable under normal conditions of use and storage.

Incompatibility: None identified.

Hazardous Decomposition Products: Phosphorus oxides may form when heated to decomposition

Hazardous Polymerization: Will not occur.

Section 11. Toxicological Information

LD50, Oral, Rat: (Sodium Phosphate Dibasic) 17 gm/kg; LD50, Dermal, Rabbit: (Potassium Phosphate Monobasic) >4640 mg/kg; details of toxic effects not reported other than lethal dose value.

Section 12. Ecological Information

Ecotoxicological Information: No information found

Chemical Fate Information: No information found

Section 13. Disposal Considerations

Dilute with water, then flush to sewer if local regulations allow for the flushing of phosphate containing solutions. If not allowed, save for recovery or recycling in an approved waste disposal facility. Always dispose of in accordance with local, state and federal regulations.

Section 14. Transport Information

Not regulated by D.O.T.

Section 15. Regulatory Information (Not meant to be all inclusive - selected regulation represented)

OSHA Status: The above items either do not contain any specifically hazardous material or the potentially hazardous material is present in such low concentration that the items do not present any immediate threat to health and safety. These items do not meet the OSHA Hazard Communication Standard (29 CFR 1910.1200) definition of a hazardous material.

TSCA Status: All components of this solution are listed on the TSCA Inventory or are mixtures (hydrates) of items listed on the TSCA Inventory.

CERCLA Reportable Quantity: Sodium Phosphate, Dibasic - 5,000 pounds.

Sara Title III:

Section 302 Extremely Hazardous Substances: No.

Section 311/312 Hazardous Categories: No

Section 313 Toxic Chemicals: No.

RCRA Status: No.

California: None reported.

Florida: None reported.

Pennsylvania: Sodium Phosphate, Dibasic is listed as an Environmental Hazard on the state's Hazardous Substances List.

WHMIS Information (Canada):

Not applicable.

Section 16. Other Information

NFPA Ratings:	Health: 1	Flammability: 0	Reactivity: 0	Special Notice Key: None
HMIS Ratings:	Health: 1	Flammability: 0	Reactivity: 0	Protective Equipment: B (Protective Eyewear, Gloves)

Rev 1, 10-19-98: (Section 16) Removed periods from NFPA and HMIS, Added® to HMIS;

Rev 2, 3-8-2000: Reformatted from WordPerfect® to Microsoft Word®, (Section 1) Revised emergency telephone number to CHEMTREC® 800-424-9300, (Section 3) Added "May cause...water." in emergency overview, (Section 7) added storage code, (Section 10) added decomposition products, (Section 11) added toxicological data, (Section 15) added Pennsylvania listing.

Rev 3, 8-25-2000: (Section 2) corrected concentration of preservative from 1 - 2 to < 0.1%.

Rev 4, 10-09-2001: Reformatted to electronic data format.

Rev 5, 04-25-2003: (Section 1) added Solutions Plus catalog number B017740.

Rev 6, 04-01-2004: (Section 1) added catalog number S1551.

When handled properly by qualified personnel, the product described herein does not present a significant health or safety hazard. Alteration of its characteristics by concentration, evaporation, addition of other substances, or other means may present hazards not specifically addressed herein and which must be evaluated by the user. The information furnished herein is believed to be accurate and represents the best data currently available to us. No warranty, expressed or implied, is made and RICCA CHEMICAL COMPANY assumes no legal responsibility or liability whatsoever resulting from its use.

Material Safety Data Sheet

Section 1. Product and Company Identification

Product Name	Buffer pH 7.38	Product Code	34170-188
Manufacturer	EMD Chemicals Inc. P.O. Box 70 480 Democrat Road Gibbstown, NJ 08027 Prior to January 1, 2003 EMD Chemicals Inc. was EM Industries, Inc. or EM Science, Division of EM Industries, Inc.	Effective Date	3/4/2003
For More Information Call	856-423-6300 Technical Service Monday-Friday: 8:00 AM - 5:00 PM	In Case of Emergency Call	800-424-9300 CHEMTREC (USA) 613-996-6666 CANUTEC (Canada) 24 Hours/Day: 7 Days/Week
Synonym	None.		
Material Uses	Laboratory Reagent		
Chemical Family	Mixture.		

Section 2. Composition and Information on Ingredients

Component	CAS #	% by Weight
Sodium Phosphate, Dibasic, Anhydrous	7558-79-4	<0.5
Potassium Phosphate	7778-77-0	<0.2
Dowicide A	132-27-4	0.05
Water	7732-18-5	>99

Section 3. Hazards Identification

Physical State and Appearance	Liquid.
Emergency Overview	CAUTION ! MAY BE HARMFUL IF SWALLOWED. MAY CAUSE EYE AND SKIN IRRITATION. WARNING: This product contains a chemical(s) known to the State of California to cause cancer.
Routes of Entry	Eye contact. Inhalation. Ingestion.
Potential Acute Health Effects	<p>Eyes May be hazardous in case of eye contact (irritant).</p> <p>Skin May be hazardous in case of skin contact (irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.</p> <p>Inhalation No known acute effects of this product resulting from inhalation.</p> <p>Ingestion May be hazardous in case of ingestion.</p>
Potential Chronic Health Effects	<p>Carcinogenic Effects This material is not known to cause cancer in animals or humans.</p> <p>Additional information See Toxicological Information (section 11)</p>
Medical Conditions Aggravated by Overexposure:	Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4. First Aid Measures

Eye Contact	Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention.
Skin Contact	In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.
Inhalation	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Section 5. Fire Fighting Measures

Flammability of the Product	Non-flammable.
Auto-ignition Temperature	Not applicable.
Flash Points	Not applicable.
Flammable Limits	Not applicable.
Products of Combustion	Not applicable.
Fire Hazards in Presence of Various Substances	Not applicable.
Explosion Hazards in Presence of Various Substances	Risks of explosion of the product in presence of static discharge: No.
Fire Fighting Media and Instructions	Risks of explosion of the product in presence of mechanical impact: No.
Protective Clothing (Fire)	Not applicable.
Special Remarks on Fire Hazards	Not available.
Special Remarks on Explosion Hazards	Not available.

Section 6. Accidental Release Measures

Small Spill and Leak	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.
Large Spill and Leak	Absorb with an inert material and put the spilled material in an appropriate waste disposal.
Spill Kit Information	No specific spill kit required for this product.

Section 7. Handling and Storage

Handling	Avoid contact with eyes, skin and clothing. Do not ingest. Wash thoroughly after handling.
Storage	Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8. Exposure Controls/Personal Protection

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective occupational exposure limits.
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Personal Protection

Eyes	Splash goggles.
Body	Lab coat.
Respiratory	Not applicable.
Hands	Gloves.
Feet	Not applicable.

Protective Clothing (Pictograms)



Personal Protection in Case of a Large Spill	Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.
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Product Name Exposure Limits

Sodium Phosphate, Dibasic, Anhydrous	Not available.
Potassium Phosphate	Not available.
Dowicide A	Not available.
Water	Not available.

Section 9. Physical and Chemical Properties

Odor	Odorless.
Color	Colorless.
Physical State and Appearance	Liquid.
Molecular Weight	Not applicable.
Molecular Formula	Not applicable.
pH	7.38 [Neutral.]
Boiling/Condensation Point	The lowest known value is 99.9°C (211.8°F) (Water).
Melting/Freezing Point	May start to solidify at -0.1°C (31.8°F) based on data for: Water.
Specific Gravity	Not available.
Vapor Pressure	Not available.

Vapor Density	Not available.
Odor Threshold	Not available.
Evaporation Rate	0.36 (Water) compared to(n-Butyl Acetate =1)
LogKow	Not available.
Solubility	Soluble in water.

Section 10. Stability and Reactivity

Stability and Reactivity	The product is stable.
Conditions of Instability	Not available.
Incompatibility with Various Substances	Highly reactive with oxidizing agents, metals, acids.
Rem/Incompatibility	Incompatible with Strong Bases and alkalioids
Hazardous Decomposition Products	COx
Hazardous Polymerization	Will not occur.

Section 11. Toxicological Information

RTECS Number:	Sodium Phosphate, Dibasic, Anhydrous	WC4500000
	Potassium Phosphate	TC6615500
	Dowicide A	DV7700000
	Water	ZC0110000
Toxicity	LD50: Not available. LC50: Not available.	
Chronic Effects on Humans	Not available.	
Acute Effects on Humans	May be hazardous in case of eye contact (irritant). May be hazardous in case of skin contact (irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. May be hazardous in case of ingestion.	
Synergetic Products (Toxicologically)	Not available.	
Irritancy	Draize Test: Not available.	
Sensitization	Not available.	
Carcinogenic Effects	This material is not known to cause cancer in animals or humans.	
Toxicity to Reproductive System	Not available.	
Teratogenic Effects	Not available.	
Mutagenic Effects	Not available.	

Section 12. Ecological Information

Ecotoxicity	Not available.
BOD5 and COD	Not available.

Section 13. Disposal Considerations

EPA Waste Number	Not available.
Treatment	Material does not have an EPA Waste number and is not a listed waste, however consultation with a permitted waste disposal site (TSD) should be accomplished. ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

Section 14. Transport Information

DOT Classification	Not available.
TDG Classification	Not available.
IMO/IMDG Classification	Not available.
ICAO/IATA Classification	Not available.

Section 15. Regulatory Information

U.S. Federal Regulations	TSCA 8(b) inventory: Sodium Phosphate, Dibasic, Anhydrous; Potassium Phosphate; Dowicide A; Water SARA 302/304/311/312 extremely hazardous substances: No products were found. SARA 302/304 emergency planning and notification: No products were found. SARA 302/304/311/312 hazardous chemicals: Sodium Phosphate, Dibasic, Anhydrous; Dowicide A SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Sodium Phosphate, Dibasic, Anhydrous: Immediate (Acute) Health Hazard; Dowicide A: Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard Clean Water Act (CWA) 307: No products were found.
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Clean Water Act (CWA) 311: Sodium Phosphate, Dibasic, Anhydrous
Clean air act (CAA) 112 accidental release prevention: No products were found.
Clean air act (CAA) 112 regulated flammable substances: No products were found.
Clean air act (CAA) 112 regulated toxic substances: No products were found.

WHMIS (Canada)

Not controlled under WHMIS (Canada).

CEPA DSL: Sodium Phosphate, Dibasic, Anhydrous; Potassium Phosphate; Dowicide A; Water
This product has been classified in accordance with the hazard criteria of the Controlled Product Regulations and the MSDS contains all required information.

International Regulations

EINECS

Sodium Phosphate, Dibasic, Anhydrous 231-448-7
Potassium Phosphate 231-913-4
Dowicide A 205-055-6
Water 231-791-2

DSCL (EEC)

This product is not classified according to the EU regulations.

International Lists

Australia (NICNAS): Sodium Phosphate, Dibasic, Anhydrous; Potassium Phosphate; Dowicide A; Water

Japan (MITI): Sodium Phosphate, Dibasic, Anhydrous; Potassium Phosphate; Dowicide A; Water

Japan (MOL): Dowicide A

Korea (TCCL): Sodium Phosphate, Dibasic, Anhydrous; Potassium Phosphate; Dowicide A; Water

Philippines (RA6969): Sodium Phosphate, Dibasic, Anhydrous; Potassium Phosphate; Dowicide A; Water
China: No products were found.

State Regulations

Pennsylvania RTK: Sodium Phosphate, Dibasic, Anhydrous: (environmental hazard, generic environmental hazard)

Massachusetts RTK: Sodium Phosphate, Dibasic, Anhydrous; Dowicide A

New Jersey: Buffer pH 7.38

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute:
Dowicide A

California prop. 65 (no significant risk level): Dowicide A

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Dowicide A

Section 16. Other Information

**National Fire
Protection
Association
(U.S.A.)**

**0 0
Health 0 0**

Fire Hazard

Reactivity

Specific Hazard

**Changed Since Last
Revision
Notice to Reader**

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The statements contained herein are based upon technical data that EMD Chemicals Inc. believes to be reliable, are offered for information purposes only and as a guide to the appropriate precautionary and emergency handling of the material by a properly trained person having the necessary technical skills. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use, storage and disposal of these materials and the safety and health of employees and customers and the protection of the environment. EMD CHEMICALS INC. MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, WITH RESPECT TO THE INFORMATION HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

Section 1: Chemical Product and Company Identification

Catalog Numbers:

1601, 1602, B017900

Product Identity:

BUFFER, REFERENCE STD, pH 10.00; BUFFER, PRECISION REFERENCE STD, pH 10.000 (Color coded blue), including Solutions Plus brand

Manufacturer's Name:

RICCA CHEMICAL COMPANY

Emergency Contact(24 hr)**CHEMTREC:** 800-424-9300**CAGE Code:** 0V553**Address:**PO BOX 13090
ARLINGTON, TX 76094**Telephone Number For Information:**

817-461-5601

Date Prepared:

3/4/1999

Revision: 3

Last revised: 7/31/2003

Print Date: 7/16/2004

Section 2. Composition/Information on Ingredients

Component	CAS Registry#	Percent Concentration	ACGIH TLV	OSHA PEL
Sodium Bicarbonate	144-55-8	< 1	Not Available	Not Available
Preservative (No Mercury compounds or Formaldehyde)	Proprietary	<0.1	Not Available	Not Available
Inert Dye	proprietary	< 0.1	Not Available	Not Available
Water, Deionized	7732-18-5	Balance	Not Available	Not Available
Sodium Carbonate	497-19-8	< 1	Not Available	Not Available

Section 3 : Hazard Identification

Emergency Overview: Non-flammable, non-toxic, non-corrosive. Does not present any significant health hazards. Wash areas of contact with water.

Target Organs: eyes, skin

Eye Contact: May cause slight irritation.

Inhalation: May cause irritation.

Skin Contact: May cause slight irritation.

Ingestion: May cause nausea, vomiting, diarrhea and cramps.

Chronic Effects/Carcinogenicity: None

IARC - No.

NTP - No.

OSHA - No.

Teratology (Birth Defect) Information: Mutation data cited in 'Registry of Toxic Effects of Chemical Substances' for Sodium Bicarbonate.

Reproductive Information: Reproductive effects cited in 'Registry of Toxic Effects of Chemical Substances' for Sodium Bicarbonate. Reproductive effects cited in 'Registry of Toxic Effects of Chemical Substances' for Sodium Carbonate.

Section 4. First Aid Measures – In all cases, seek qualified evaluation.

Eye Contact: Irrigate immediately with large quantity of water for at least 15 minutes. Call a physician if irritation develops.

Inhalation: Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult, give oxygen.

Skin Contact: Flush with plenty of water for at least 15 minutes. Call a physician if irritation develops.

Ingestion: Dilute with water or milk. Call a physician if necessary.

Section 5. Fire Fighting Measures

Flash Point: Not Available.

Method Used: Not Available.

LFL: Not Available.

UFL: Not Available.

Extinguishing Media: Use any means suitable for extinguishing surrounding fire.

Fire & Explosion Hazards: Not considered to be a fire or explosion hazard.

Fire Fighting Instructions: Use normal procedures/instructions.

Fire Fighting Equipment: Use protective clothing and breathing equipment appropriate for the surrounding fire.

Section 6. Accidental Release Measures

Absorb with suitable material and treat as normal refuse. Small amounts of the liquid may be flushed to the drain with excess water. Always dispose of in accordance with local regulations.

Section 7. Handling and Storage

As with all chemicals, wash hands thoroughly after handling. Avoid contact with eyes and skin. Protect from freezing and physical damage.

SAFETY STORAGE CODE: General

Section 8. Exposure Control/Personal Protection

Engineering Controls: No specific controls are needed. Normal room ventilation is adequate.

Respiratory Protection: Normal room ventilation is adequate.

Skin Protection: Chemical resistant gloves.

Eye Protection: Safety glasses or goggles.

Section 9. Physical and Chemical Properties

Appearance: Clear, blue colored liquid

pH: 10.0

Odor: Odorless

Boiling Point(°C): Approximately 100

Solubility in Water: Infinite

Melting Point(°C): Approximately 0

Specific Gravity: Approximately 1

Vapor Pressure: Not Applicable.

Section 10. Stability and Reactivity

Chemical Stability: Stable under normal conditions of use and storage.

Incompatibility: Acids

Hazardous Decomposition Products: Oxides of Sodium.

Hazardous Polymerization: Will not occur.

Section 11. Toxicological Information

LD50, Oral, Rat: 4090 mg/kg (Sodium Carbonate), 4220 mg/kg (Sodium Bicarbonate), details of toxic effects not reported other than lethal dose value.

Section 12. Ecological Information

Ecotoxicological Information: No information found.

Chemical Fate Information: No information found

Section 13. Disposal Considerations

Dilute with water, then flush to sewer if local regulations allow. If not allowed, save for recovery or recycling in an approved waste disposal facility. Always dispose of in accordance with local, state and federal regulations.

Section 14. Transport Information

Not regulated by D.O.T.

Section 15. Regulatory Information (Not meant to be all inclusive - selected regulation represented)

OSHA Status: The above items either do not contain any specifically hazardous material or the potentially hazardous material is present in such low concentration that the items do not present any immediate threat to health and safety. These items do not meet the OSHA Hazard Communication Standard (29 CFR 1910.1200) definition of a hazardous material.

TSCA Status: All components of this solution are listed on the TSCA Inventory or are mixtures (hydrates) of items listed on the TSCA Inventory.

CERCLA Reportable Quantity: Not Reportable.

Sara Title III:

Section 302 Extremely Hazardous Substances: No.

Section 311/312 Hazardous Categories: No

Section 313 Toxic Chemicals: No.

RCRA Status: No.

California: None reported.

Florida: None reported.

Pennsylvania: None reported.

WHMIS Information (Canada):

Not applicable.

Section 16. Other Information

NFPA Ratings:	Health: 1	Flammability: 0	Reactivity: 0	Special Notice Key: None
HMIS Ratings:	Health: 1	Flammability: 0	Reactivity: 0	Protective Equipment: B (Protective Eyewear, Gloves)

Rev 1, 3-27-2000: Reformatted from WordPerfect® to Microsoft Word®; (Section 1) Revised emergency telephone number to CHEMTREC® 800-424-9300; (Section 2) revised percent concentrations to < 1; (Section 7) Added storage code.

Rev 2, 10-09-2001: Reformatted to electronic data format.

Rev 3, 07-31-2003: (Section 1) added Solutions Plus catalog number B017900 effective 9-1-03.

When handled properly by qualified personnel, the product described herein does not present a significant health or safety hazard. Alteration of its characteristics by concentration, evaporation, addition of other substances, or other means may present hazards not specifically addressed herein and which must be evaluated by the user. The information furnished herein is believed to be accurate and represents the best data currently available to us. No warranty, expressed or implied, is made and RICCA CHEMICAL COMPANY assumes no legal responsibility or liability whatsoever resulting from its use.

Material Safety Data Sheet

Section 1. Product and Company Identification

Product Name	Nitric Acid	Product Code	NX0409
Manufacturer	EMD Chemicals Inc. P.O. Box 70 480 Democrat Road Gibbstown, NJ 08027 Prior to January 1, 2003 EMD Chemicals Inc. was EM Industries, Inc. or EM Science, Division of EM Industries, Inc.	Effective Date	7/7/2004
For More Information Call	856-423-6300 Technical Service Monday-Friday: 8:00 AM - 5:00 PM	In Case of Emergency Call	800-424-9300 CHEMTREC (USA) 613-996-6666 CANUTEC (Canada) 24 Hours/Day: 7 Days/Week
Synonym	None.		
Material Uses	Laboratory Reagent		
Chemical Family	Inorganic acid.		

Section 2. Composition and Information on Ingredients

Component	CAS #	% by Weight
Nitric Acid	7697-37-2	100

The 100 % indicates this product is a concentrated acid. Assay (Nitric Acid) value is approximately 70%.

Section 3. Hazards Identification

Physical State and Appearance	Liquid. (Yellowish.)
Emergency Overview	DANGER ! POISON ! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. VAPOR REDUCES OXYGEN AVAILABLE FOR BREATHING. MAY BE FATAL IF INHALED OR SWALLOWED. CAUSES SEVERE RESPIRATORY TRACT, EYE AND SKIN BURNS. CAUSES DAMAGE TO THE FOLLOWING ORGANS: LUNGS, MUCOUS MEMBRANES, RESPIRATORY TRACT, SKIN, EYE, LENS OR CORNEA, TEETH.
Routes of Entry	Absorbed through skin. Dermal contact. Inhalation. Ingestion.
Potential Acute Health Effects	Eyes Hazardous in case of eye contact (corrosive). Causes eye burns. Skin Corrosive to skin on contact. Inhalation Extremely hazardous in case of inhalation (lung corrosive). Do not breathe vapor or mist. May be fatal if inhaled. Inhalation of vapors may cause dizziness, an irregular heartbeat, narcosis, nausea or asphyxiation. Ingestion Extremely hazardous in case of ingestion. May be fatal if swallowed.
Potential Chronic Health Effects	Carcinogenic Effects This material is not known to cause cancer in animals or humans.
Medical Conditions Aggravated by Overexposure:	Additional information See Toxicological Information (section 11) Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4. First Aid Measures

Eye Contact	Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.
Skin Contact	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Inhalation	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion	If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

+ Section 5. Fire Fighting Measures

Flammability of the Product	Non-flammable.
Auto-ignition Temperature	Not applicable.
Flash Points	Not applicable.
Flammable Limits	Not available.
Products of Combustion	Not applicable.
Fire Hazards in Presence of Various Substances	Not applicable.
Explosion Hazards in Presence of Various Substances	Risks of explosion of the product in presence of static discharge: No.
Fire Fighting Media and Instructions	Risks of explosion of the product in presence of mechanical impact: No. Use DRY chemical powder. Use water spray or fog.
Protective Clothing (Fire)	Wear suitable protective clothing.
Special Remarks on Fire Hazards	Spillage May Cause Fire Or Liberated Dangerous Gas.
Special Remarks on Explosion Hazards	Can react explosively with certain reducing agents and combustibles: such as metal powders,carbides,H2S and turpentine.

Section 6. Accidental Release Measures

Small Spill and Leak	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.
Large Spill and Leak	Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.
Spill Kit Information	The following EMD Chemicals Inc. SpillSolv (TM) absorbent is recommended for this product: SX1310 Acid Treatment Kit

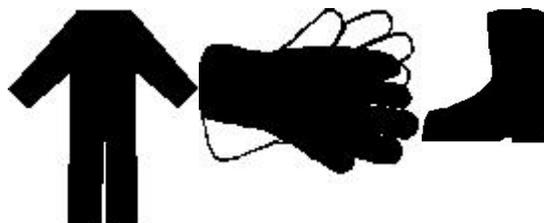
Section 7. Handling and Storage

Handling	Handle and open container with care. Avoid contact with combustible materials. Do not breathe vapor or mist. Do not ingest. Do not get in eyes, on skin or clothing. After handling, always wash hands thoroughly with soap and water.
Storage	Keep container tightly closed. Handle and open container with care. Separate from acids, alkalies, reducing agents and combustibles.

Section 8. Exposure Controls/Personal Protection

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective occupational exposure limits. Ensure that eyewash stations and safety showers are proximal to the work-station location.
Personal Protection	
Eyes	Face shield.
Body	Full suit.
Respiratory	Approved/certified Self-Contained Breathing Apparatus (SCBA). Wear appropriate respirator when ventilation is inadequate.
Hands	Gloves.
Feet	Boots.

Protective Clothing (Pictograms)



Personal Protection in Case of a Large Spill Splash goggles. Full suit. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Product Name	Exposure Limits
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Nitric Acid

ACGIH (United States, 1994).
 STEL: 10 mg/m³ 15 minute(s).
 STEL: 4 ppm 15 minute(s).
 TWA: 5.2 mg/m³ 8 hour(s).
 TWA: 2 ppm 8 hour(s).
NIOSH REL (United States, 1994).
 STEL: 10 mg/m³ 15 minute(s).

STEL: 4 ppm 15 minute(s).
TWA: 5 mg/m³ 10 hour(s).
TWA: 2 ppm 10 hour(s).

OSHA Final Rule (United States, 1989).

STEL: 10 mg/m³ 15 minute(s).
STEL: 4 ppm 15 minute(s).
TWA: 5 mg/m³ 8 hour(s).
TWA: 2 ppm 8 hour(s).

National Authority for Occupational Safety/Health (Ireland, 1999).

STEL: 10 mg/m³ 15 minute(s).
STEL: 4 ppm 15 minute(s).
OEL: 5 mg/m³ 8 hour(s).
OEL: 2 ppm 8 hour(s).

The 100 % indicates this product is a concentrated acid. Assay (Nitric Acid) value is approximately 70%.

Section 9. Physical and Chemical Properties

Odor	Acrid; suffocating
Color	Colorless to light yellow.
Physical State and Appearance	Liquid. (Yellowish.)
Molecular Weight	63.02 g/mole
Molecular Formula	H-N-O ₃
pH	Not available.
Boiling/Condensation Point	83.94°C (183.1°F)
Melting/Freezing Point	-41.06°C (-41.9°F)
Specific Gravity	1.49 (Water = 1)
Vapor Pressure	0.3 kPa (2.6 mmHg) (@ 20°C)
Vapor Density	>1 (Air = 1)
Odor Threshold	2 ppm
Evaporation Rate	Not available.
LogKow	Not available.
Solubility	Soluble in water.

Section 10. Stability and Reactivity

Stability and Reactivity	The product is stable.
Conditions of Instability	Container explosion may occur under fire conditions or when heated.
Incompatibility with Various Substances	Reactive with combustible materials, organic materials, metals, acids, alkalis.
Rem/Incompatibility	Not available.
Hazardous Decomposition Products	NO _x
Hazardous Polymerization	Will not occur.

+ Section 11. Toxicological Information

RTECS Number:

Nitric Acid QU5900000, QU5775000

Toxicity	Acute toxicity of the vapor (LC50): 76 ppm 4 hour(s) [Rat].
Chronic Effects on Humans	Not available.
Acute Effects on Humans	Corrosive to eyes and skin. May be fatal if swallowed.
Special Remarks on Other Toxic Effects on Humans	Symptoms Of Lung Injury May Be Delayed.
Synergetic Products (Toxicologically)	Not available.
Irritancy	Draize Test: Not available.
Sensitization	Not available.
Carcinogenic Effects	This material is not known to cause cancer in animals or humans.
Toxicity to Reproductive System	Tests on laboratory animals for reproductive effects are cited in Registry of Toxic Effects on Chemical Substances (RTECS).
Teratogenic Effects	Not available.
Mutagenic Effects	Not available.

Section 12. Ecological Information

Ecotoxicity	Not available.
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BOD5 and COD Not available.
Toxicity of the Products of Biodegradation The products of degradation are less toxic than the product itself.

Section 13. Disposal Considerations

EPA Waste Number D002 D001
Treatment Specified technology- Neutralize to pH 6-9. Contact your local permitted waste disposal site (TSD) for permissible treatments sites.
ALWAYS CONTACT PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS. ALWAYS CONTACT PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

+ Section 14. Transport Information

DOT Classification Proper Shipping Name: NITRIC ACID
Hazard Class: 8
UN number: UN2031
Packing Group: II
RQ: 1000 lbs. (453.6 kg)
TDG Classification Not available.
IMO/IMDG Classification Proper Shipping Name: NITRIC ACID
Hazard Class: 8
UN number: UN2031
Packing Group: II
RQ: 1000
ICAO/IATA Classification Not available.



Section 15. Regulatory Information

U.S. Federal Regulations TSCA 8(b) inventory: Nitric Acid
SARA 302/304/311/312 extremely hazardous substances: Nitric Acid
SARA 302/304 emergency planning and notification: Nitric Acid
SARA 302/304/311/312 hazardous chemicals: Nitric Acid
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Nitric Acid: Fire Hazard, reactive, Immediate (Acute) Health Hazard
SARA 313 toxic chemical notification and release reporting: Nitric Acid
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: Nitric Acid
Clean air act (CAA) 112 accidental release prevention: Nitric Acid
Clean air act (CAA) 112 regulated flammable substances: No products were found.
Clean air act (CAA) 112 regulated toxic substances: Nitric Acid
WHMIS (Canada) CLASS C: Oxidizing material.
Class D-1B: Material causing immediate and serious toxic effects (TOXIC).
CLASS E: Corrosive liquid.
CEPA DSL: Nitric Acid
This product has been classified in accordance with the hazard criteria of the Controlled Product Regulations and the MSDS contains all required information.
International Regulations
EINECS Nitric Acid 231-714-2
DSCL (EEC) R26- Very toxic by inhalation.
R35- Causes severe burns.
International Lists Australia (NICNAS): Nitric Acid
Japan (MITT): Nitric Acid
Korea (TCCL): Nitric Acid
Philippines (RA6969): Nitric Acid
China: No products were found.
State Regulations Pennsylvania RTK: Nitric Acid: (environmental hazard, generic environmental hazard)
Massachusetts RTK: Nitric Acid
New Jersey: Nitric Acid
California prop. 65: No products were found.

+ Section 16. Other Information

**National Fire
Protection
Association**

Health 4 0 1 **Fire Hazard**
OXY

(U.S.A.)

Reactivity

Specific Hazard

Other Special

Considerations

Changed Since Last

Revision

Notice to Reader

The 100 % indicates this product is a concentrated acid. Assay (Nitric Acid) value is approximately 70%.

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The statements contained herein are based upon technical data that EMD Chemicals Inc. believes to be reliable, are offered for information purposes only and as a guide to the appropriate precautionary and emergency handling of the material by a properly trained person having the necessary technical skills. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use, storage and disposal of these materials and the safety and health of employees and customers and the protection of the environment. EMD CHEMICALS INC. MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, WITH RESPECT TO THE INFORMATION HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

Material Safety Data Sheet

Section 1. Product and Company Identification

Product Name Sulfuric Acid, Technical
Manufacturer EMD Chemicals Inc.
P.O. Box 70
480 Democrat Road
Gibbstown, NJ 08027
Prior to January 1, 2003 EMD Chemicals Inc. was EM Industries, Inc. or EM Science, Division of EM Industries, Inc.

Product Code SX1244E
Effective Date 3/3/2003

For More Information Call

856-423-6300 Technical Service
Monday-Friday: 8:00 AM - 5:00 PM

In Case of Emergency Call

800-424-9300 CHEMTREC (USA)
613-996-6666 CANUTEC (Canada)
24 Hours/Day: 7 Days/Week

Synonym None.
Material Uses Analytical reagent.
Chemical Family Acid.

Section 2. Composition and Information on Ingredients

Component	CAS #	% by Weight
SULFURIC ACID	7664-93-9	52-92
WATER	7732-18-5	8-48

Section 3. Hazards Identification

Physical State and Appearance Liquid.

Emergency Overview

DANGER!
POISON!
CAUSES SEVERE RESPIRATORY TRACT, EYE AND SKIN BURNS.
OXIDIZER.
CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE.
HARMFUL IF INHALED OR SWALLOWED.
SUSPECT CANCER HAZARD
CONTAINS MATERIAL WHICH MAY CAUSE CANCER
CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS: LUNGS, MUCOUS MEMBRANES, RESPIRATORY TRACT, SKIN, EYE, LENS OR CORNEA, TEETH.
Absorbed through skin. Eye contact. Inhalation. Ingestion.

Routes of Entry

Potential Acute Health Effects

Eyes Extremely hazardous in case of eye contact (corrosive). Causes severe eye burns.
Skin Extremely hazardous in case of skin contact (corrosive). Skin contact produces severe burns.
Inhalation Extremely hazardous in case of inhalation (lung corrosive). Hazardous in case of inhalation.
Ingestion Hazardous in case of ingestion.

Potential Chronic Health Effects

Carcinogenic Effects Classified A2 (Suspected for human.) by ACGIH [SULFURIC ACID].

Additional information See Toxicological Information (section 11)

Medical Conditions

Aggravated by

Overexposure:

Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation.
Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4. First Aid Measures

Eye Contact

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Inhalation

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Section 5. Fire Fighting Measures

Flammability of the Product	Non-flammable.
Auto-ignition Temperature	Not applicable.
Flash Points	Not applicable.
Flammable Limits	Not applicable.
Products of Combustion	Not available.
Fire Hazards in Presence of Various Substances	Not applicable.
Explosion Hazards in Presence of Various Substances	Risks of explosion of the product in presence of static discharge: No.
Fire Fighting Media and Instructions	Risks of explosion of the product in presence of mechanical impact: No.
Protective Clothing (Fire)	Not applicable.
Special Remarks on Fire Hazards	Flammable hydrogen gas may be produced on prolonged contact with metals such as aluminum, tin, lead and zinc.
Special Remarks on Explosion Hazards	Not available.

Section 6. Accidental Release Measures

Small Spill and Leak	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.
Large Spill and Leak	Stop leak if without risk. Cover with DRY earth, DRY sand or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Do not get water inside container. Avoid contact with a combustible material (wood, paper, oil, clothing...). Keep substance damp using water spray. Do not touch spilled material. Use water spray curtain to divert vapor drift. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.
Spill Kit Information	The following EMD Chemicals Inc. SpillSolv® absorbent is recommended for this product: SX1310 Acid Treatment Kit

Section 7. Handling and Storage

Handling	Store in tightly closed container. Avoid contact with combustible materials. Avoid breathing vapors or spray mists. Do not get in eyes, on skin, or on clothing. Do not ingest.
Storage	Keep container in a cool, well-ventilated area. Separate from acids, alkalies, reducing agents and combustibles.

Section 8. Exposure Controls/Personal Protection

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.
Personal Protection	
Eyes	Face shield.
Body	Full suit.
Respiratory	Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Hands	Gloves.
Feet	Boots.
Protective Clothing (Pictograms)	
Personal Protection in Case of a Large Spill	Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Product Name	Exposure Limits
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SULFURIC ACID

AUVA (Austria, 1995).
PEAK: 2 mg/m³ 8 times per shift, Period: 5 minute(s).
MAK: 1 mg/m³
Belgium Minister of Labour (Belgium, 1998).
VCD: 3 mg/m³
VL: 1 mg/m³
BAUA (Germany, 1997).
PEAK: 1 mg/m³
MAK: 1 mg/m³
DK-Arbejdstyilsinet (Denmark, 1996).
GV: 1 mg/m³
Tyterveyslaitos (Finland, 1998).
STEL: 3 mg/m³
TWA: 1 mg/m³

INRS (France, 1996).
 VLE: 3 mg/m³
 VME: 1 mg/m³
National Authority for Occupational Safety/Health (Ireland, 1999).
 OEL: 1 mg/m³
Arbeidsinspectie (Netherlands, 1999).
 TGG 8 uur: 1 mg/m³
N-Arbeidstilsynet (Norway, 1996).
 AN: 1 mg/m³
AFS (Sweden, 1996).
 KTV: 3 mg/m³
 NGV: 1 mg/m³
EH40-OES (United Kingdom (UK), 1997).
 MEL: 1 mg/m³
ACGIH (United States, 1996).
 STEL: 3 mg/m³
 TWA: 1 mg/m³
NIOSH REL (United States, 1994).
 TWA: 1 mg/m³ Period: 10 hour(s).
OSHA Final Rule (United States, 1989).
 TWA: 1 mg/m³
 Not available.

WATER

Section 9. Physical and Chemical Properties

Odor	Not available.
Color	Clear.
Physical State and Appearance	Liquid.
Molecular Weight	Not applicable.
Molecular Formula	Not applicable.
pH	Acidic.
Boiling/Condensation Point	The lowest known value is 99.9°C (211.8°F) (WATER). Weighted average: 236.81°C (458.3°F)
Melting/Freezing Point	May start to solidify at -0.1°C (31.8°F) based on data for: WATER. Weighted average: -7.23°C (19°F)
Specific Gravity	The only known value is 1.84 (Water = 1) (SULFURIC ACID).
Vapor Pressure	The highest known value is 0.1 kPa (1 mmHg) (@ 20°C) (SULFURIC ACID).
Vapor Density	Not available.
Odor Threshold	The highest known value is >1 ppm (SULFURIC ACID)
Evaporation Rate	0.36 (WATER) compared to (n-BUTYL ACETATE=1)
LogKow	Not available.
Solubility	Soluble in water.

Section 10. Stability and Reactivity

Stability and Reactivity	The product is stable.
Conditions of Instability	Not available.
Incompatibility with Various Substances	Highly reactive with reducing agents, combustible materials, metals, acids, alkalis.
Rem/Incompatibility	Not available.
Hazardous Decomposition Products	Not available.
Hazardous Polymerization	Will not occur.

Section 11. Toxicological Information

RTECS Number:	Sulfuric Acid	WS5600000
	Water	ZC0110000
Toxicity	Acute oral toxicity (LD50): 2972 mg/kg (Rat) (Calculated value for the mixture). Acute toxicity of the vapor (LC50): 78 ppm 4 hours (Mouse) (Calculated value for the mixture).	
Chronic Effects on Humans	CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH [SULFURIC ACID].	
Acute Effects on Humans	Extremely hazardous in case of eye contact (corrosive). Causes severe eye burns. Extremely hazardous in case of skin contact (corrosive). Skin contact produces severe burns. Extremely hazardous in case of inhalation (lung corrosive). Hazardous in case of inhalation. Hazardous in case of ingestion.	
Synergetic Products (Toxicologically)	Not available.	
Irritancy	Draize Test: Not available.	
Sensitization	Slightly hazardous in case of inhalation (lung sensitizer).	
Carcinogenic Effects	Classified A2 (Suspected for human.) by ACGIH [SULFURIC ACID].	

Toxicity to Reproductive System	Not available.
Teratogenic Effects	Not available.
Mutagenic Effects	Not available.

Section 12. Ecological Information

Ecotoxicity	Not available.
BOD5 and COD	Not available.
Toxicity of the Products of Biodegradation	The products of degradation are less toxic than the product itself.

Section 13. Disposal Considerations

EPA Waste Number	D002
Treatment	Specified Technology - Neutralize to pH 6-9. Contact your local permitted waste disposal site (TSD) for permissible treatment sites. Always contact a permitted waste disposal (TSD) to assure compliance with all current local, state, and Federal Regulations..

Section 14. Transport Information

DOT Classification	Proper Shipping Name: SULFURIC ACID Hazard Class: 8 UN number: UN1830 Packing Group: II RQ: 1000 lbs. (453.6 kg)
TDG Classification	Not available.
IMO/IMDG Classification	Proper Shipping Name: SULPHURIC ACID Hazard Class: 8 UN number: UN1830 Packing Group: II RQ: 1000
ICAO/IATA Classification	Not available.

Section 15. Regulatory Information

U.S. Federal Regulations	TSCA 8(b) inventory: SULFURIC ACID; WATER SARA 302/304/311/312 extremely hazardous substances: SULFURIC ACID SARA 302/304 emergency planning and notification: SULFURIC ACID SARA 302/304/311/312 hazardous chemicals: SULFURIC ACID SARA 311/312 MSDS distribution - chemical inventory - hazard identification: SULFURIC ACID: reactive, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard SARA 313 toxic chemical notification and release reporting: SULFURIC ACID 72% Clean Water Act (CWA) 307: No products were found. Clean Water Act (CWA) 311: SULFURIC ACID Clean air act (CAA) 112 accidental release prevention: No products were found. Clean air act (CAA) 112 regulated flammable substances: No products were found. Clean air act (CAA) 112 regulated toxic substances: No products were found.
WHMIS (Canada)	CLASS C: Oxidizing material. Class D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS E: Corrosive liquid. CEPA DSL: SULFURIC ACID; WATER This product has been classified in accordance with the hazard criteria of the Controlled Product Regulations and the MSDS contains all required information.
International Regulations	
EINECS	SULFURIC ACID 231-639-5 WATER 231-791-2
DSCL (EEC)	R35- Causes severe burns. R45- May cause cancer.
International Lists	Australia (NICNAS): SULFURIC ACID; WATER Japan (MITI): SULFURIC ACID; WATER Korea (TCCL): SULFURIC ACID; WATER Philippines (RA6969): SULFURIC ACID; WATER China: No products were found.
State Regulations	Pennsylvania RTK: SULFURIC ACID: (environmental hazard, generic environmental hazard) Massachusetts RTK: SULFURIC ACID New Jersey: SULFURIC ACID California prop. 65: No products were found.

Section 16. Other Information

**National Fire
Protection
Association
(U.S.A.)**

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Health W**

**Fire Hazard
Reactivity
Specific Hazard**

**Changed Since Last
Revision +
Notice to Reader**

The statements contained herein are based upon technical data that EMD Chemicals Inc. believes to be reliable, are offered for information purposes only and as a guide to the appropriate precautionary and emergency handling of the material by a properly trained person having the necessary technical skills. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of suitability and completeness of information from all sources to assure proper use, storage and disposal of these materials and the safety and health of employees and customers and the protection of the environment. EMD CHEMICALS INC. MAKES NO REPRESENTATION OR WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, WITH RESPECT TO THE INFORMATION HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

Material Safety Data Sheet

Section 1. Product and Company Identification

Product Name	Sulphuric Acid 0.0200N	Product Code	VW3229
Manufacturer	EMD Chemicals Inc. P.O. Box 70 480 Democrat Road Gibbstown, NJ 08027 Prior to January 1, 2003 EMD Chemicals Inc. was EM Industries, Inc. or EM Science, Division of EM Industries, Inc.	Effective Date	3/4/2003
For More Information Call	856-423-6300 Technical Service Monday-Friday: 8:00 AM - 5:00 PM	In Case of Emergency Call	800-424-9300 CHEMTREC (USA) 613-996-6666 CANUTEC (Canada) 24 Hours/Day: 7 Days/Week
Synonym	None.		
Material Uses	Laboratory Reagent		
Chemical Family	Solution.		

Section 2. Composition and Information on Ingredients

Component	CAS #	% by Weight
SULFURIC ACID	7664-93-9	<1
Water	7732-18-5	>99

Section 3. Hazards Identification

Physical State and Appearance	Liquid.
Emergency Overview	CAUTION ! MAY BE HARMFUL IF SWALLOWED. MAY CAUSE RESPIRATORY TRACT, EYE AND SKIN IRRITATION. SUSPECT CANCER HAZARD CONTAINS MATERIAL WHICH MAY CAUSE CANCER CONTAINS MATERIAL WHICH CAUSES DAMAGE TO THE FOLLOWING ORGANS: LUNGS, MUCOUS MEMBRANES, RESPIRATORY TRACT, SKIN, EYE, LENS OR CORNEA, TEETH.
Routes of Entry	Eye contact. Inhalation. Ingestion.
Potential Acute Health Effects	
Eyes	May be hazardous in case of eye contact (irritant).
Skin	May be hazardous in case of skin contact (irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.
Inhalation	May be hazardous in case of inhalation (lung irritant).
Ingestion	May be hazardous in case of ingestion.
Potential Chronic Health Effects	
Carcinogenic Effects	Classified A2 (Suspected for human.) by ACGIH [SULFURIC ACID].
Medical Conditions Aggravated by Overexposure:	Additional information See Toxicological Information (section 11) Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4. First Aid Measures

Eye Contact	Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.
Skin Contact	In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Inhalation	If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion	Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

+ Section 5. Fire Fighting Measures

Flammability of the Product	Non-flammable.
Auto-ignition Temperature	Not applicable.
Flash Points	Not applicable.
Flammable Limits	Not applicable.
Products of Combustion	Not applicable.
Fire Hazards in Presence of Various Substances	Not applicable.
Explosion Hazards in Presence of Various Substances	Risks of explosion of the product in presence of static discharge: No.
Fire Fighting Media and Instructions	Risks of explosion of the product in presence of mechanical impact: No. Not applicable.
Protective Clothing (Fire)	Not applicable.
Special Remarks on Fire Hazards	Not available.
Special Remarks on Explosion Hazards	Not available.

Section 6. Accidental Release Measures

Small Spill and Leak	Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate.
Large Spill and Leak	Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Neutralize the residue with a dilute solution of sodium carbonate. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.
Spill Kit Information	The following EM SCIENCE SpillSolv (TM) absorbent is recommended for this product: SX1310 Acid Treatment Kit

Section 7. Handling and Storage

Handling	Avoid contact with eyes, skin and clothing. Do not ingest. Do not breathe vapor or mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling.
Storage	Keep container tightly closed. Keep container in a cool, well-ventilated area.

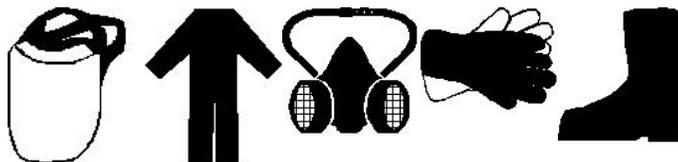
Section 8. Exposure Controls/Personal Protection

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.
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Personal Protection

Eyes	Face shield.
Body	Full suit.
Respiratory	Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Hands	Gloves.
Feet	Boots.

Protective Clothing (Pictograms)



Personal Protection in Case of a Large Spill	Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self-contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.
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Product Name

Exposure Limits

SULFURIC ACID

AUVA (Austria, 1995).
Spitzenbegrenzung: 2 mg/m³ 8 times per shift, Period: 5 minute(s).
MAK: 1 mg/m³
Belgium Minister of Labour (Belgium, 1998).
VCD: 3 mg/m³
VL: 1 mg/m³
BAUA (Germany, 1997).
Spitzenbegrenzung: 1 mg/m³
MAK: 1 mg/m³
DK-Arbejdstylnet (Denmark, 1996).
GV: 1 mg/m³

Tyterveyslaitos (Finland, 1998).
 STEL: 3 mg/m³
 TWA: 1 mg/m³
INRS (France, 1996).
 VLE: 3 mg/m³
 VME: 1 mg/m³
National Authority for Occupational Safety/Health (Ireland, 1999).
 OEL: 1 mg/m³
Arbeidsinspectie (Netherlands, 1999).
 TGG 8 uur: 1 mg/m³
N-Arbeidstilsynet (Norway, 1996).
 AN: 1 mg/m³
AFS (Sweden, 1996).
 KTV: 3 mg/m³
 NGV: 1 mg/m³
EH40-OES (United Kingdom (UK), 1997).
 TWA: 1 mg/m³
ACGIH (United States, 1996).
 STEL: 3 mg/m³
 TWA: 1 mg/m³
NIOSH REL (United States, 1994).
 TWA: 1 mg/m³ Period: 10 hour(s).
OSHA Final Rule (United States, 1989).
 TWA: 1 mg/m³
 Not available.

Water

Section 9. Physical and Chemical Properties

Odor	Odorless.
Color	Clear. Colorless.
Physical State and Appearance	Liquid.
Molecular Weight	Not applicable.
Molecular Formula	Not applicable.
pH	<2 [Acidic.]
Boiling/Condensation Point	The lowest known value is 99.9°C (211.8°F) (Water).
Melting/Freezing Point	May start to solidify at -0.1°C (31.8°F) based on data for: Water.
Specific Gravity	Not available.
Vapor Pressure	Not available.
Vapor Density	Not available.
Odor Threshold	Not available.
Evaporation Rate	0.36 (Water) compared to (n-BUTYL ACETATE=1)
LogKow	Not available.
Solubility	Soluble in water.

Section 10. Stability and Reactivity

Stability and Reactivity	The product is stable.
Conditions of Instability	Not available.
Incompatibility with Various Substances	Highly reactive with reducing agents, combustible materials, organic materials, metals, acids, alkalis.
Rem/Incompatibility	Not available.
Hazardous Decomposition Products	Not available.
Hazardous Polymerization	Will not occur.

Section 11. Toxicological Information

RTECS Number:	Sulfuric Acid	WS5600000
	Water	ZC0110000
Toxicity	LD50: Not available. LC50: Not available.	
Chronic Effects on Humans	CARCINOGENIC EFFECTS: Classified A2 (Suspected for human.) by ACGIH [SULFURIC ACID].	
Acute Effects on Humans	May be hazardous in case of eye contact (irritant). May be hazardous in case of skin contact (irritant). Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering. May be hazardous in case of inhalation (lung irritant). May be hazardous in case of ingestion.	
Synergetic Products (Toxicologically)	Not available.	
Irritancy	Draize Test: Not available.	

Sensitization	Slightly hazardous in case of inhalation (lung sensitizer).
Carcinogenic Effects	Classified A2 (Suspected for human.) by ACGIH [SULFURIC ACID].
Toxicity to Reproductive System	Not available.
Teratogenic Effects	Not available.
Mutagenic Effects	Not available.

Section 12. Ecological Information

Ecotoxicity	Not available.
BOD5 and COD	Not available.
Toxicity of the Products of Biodegradation	The products of degradation are less toxic than the product itself.

Section 13. Disposal Considerations

EPA Waste Number	D002
Treatment	Specified technology- Neutralize to pH 6-9. Contact your local permitted waste disposal site (TSD) for permissible treatments sites. ALWAYS CONTACT PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

Section 14. Transport Information

DOT Classification	Not available.
TDG Classification	Not available.
IMO/IMDG Classification	Not available.
ICAO/IATA Classification	Not available.

+ Section 15. Regulatory Information

U.S. Federal Regulations	TSCA 8(b) inventory: SULFURIC ACID; Water SARA 302/304/311/312 extremely hazardous substances: SULFURIC ACID SARA 302/304 emergency planning and notification: SULFURIC ACID SARA 302/304/311/312 hazardous chemicals: SULFURIC ACID SARA 311/312 MSDS distribution - chemical inventory - hazard identification: SULFURIC ACID: reactive, Immediate (Acute) Health Hazard, Delayed (Chronic) Health Hazard Clean Water Act (CWA) 307: No products were found. Clean Water Act (CWA) 311: SULFURIC ACID Clean air act (CAA) 112 accidental release prevention: No products were found. Clean air act (CAA) 112 regulated flammable substances: No products were found. Clean air act (CAA) 112 regulated toxic substances: No products were found.
WHMIS (Canada)	Class D-2A: Material causing other toxic effects (VERY TOXIC). CEPA DSL: SULFURIC ACID; Water This product has been classified in accordance with the hazard criteria of the Controlled Product Regulations and the MSDS contains all required information.
International Regulations	
EINECS	SULFURIC ACID 231-639-5 Water 231-791-2
DSCL (EEC)	R35- Causes severe burns.
International Lists	Australia (NICNAS): SULFURIC ACID; Water Japan (MITI): SULFURIC ACID; Water Korea (TCCL): SULFURIC ACID; Water Philippines (RA6969): SULFURIC ACID; Water China: No products were found.
State Regulations	Pennsylvania RTK: SULFURIC ACID: (environmental hazard, generic environmental hazard) Massachusetts RTK: SULFURIC ACID New Jersey: Sulphuric Acid 0.0200N California prop. 65: No products were found.

Section 16. Other Information

National Fire Protection Association (U.S.A.)

Health 0 0

Fire Hazard

Reactivity

Specific Hazard

Changed Since Last Revision +
Notice to Reader

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